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To the Officials and Citizens of the Commonwealth of Kentucky, to the Members of the American Dental Association and Invited Guests—Ladies and Gentlemen:

IN GIVING expression to the keen appreciation which our membership has for the cordial welcome extended to us by the citizens of Louisville and of Kentucky, I wish to add this personal word of tribute to the unfailing and even ingenious hospitality which has been meted out to the members of our official family from the very first day that Louisville was accepted as our place of meeting for the session of 1925. Uniformly, we have been made to feel that not only the Association as a body, but also we personally were the especial recipients of that boundless Southern hospitality which is proverbial the world over, and that we in very fact were being received spontaneously and with the greatest goodwill into the loyal, loving heart of the South. This sentiment so candidly and cordially displayed on all occasions has made the prospect of our meeting here doubly attractive, and has added to our enthusiastic ambition to make this one of the greatest meetings so far held by this Association.

OUR ORGANIZATION

The American Dental Association is the great outstanding body of organized dentistry in this country. It is larger in membership than any other dental society in the world, and its influence for good, if directed along proper lines, is beyond the bounds of imagination. It

may be well at this time to outline in brief the character of our organization. It is democratic in principle and, like all good government, it goes directly back to the people—the profession. The humblest member of a component society is entitled to a voice in the affairs of the parent body. By his vote, he helps to elect the delegates to the annual sessions. The House of Delegates, coming directly from the component societies, constitutes the legislative wing of our organization, and it is consequently of much moment that the component societies exercise great care in their selection of delegates—a care which in the past has not always been manifest. When it is remembered that all important legislation governing the affairs of the Association is enacted by the House of Delegates, it at once becomes apparent how essential it is that the personnel of this body be composed of the greatest minds in the profession. And, in turn, as soon as a man is elected a delegate, he should take his position seriously and should study the needs of the organization carefully, to the end that he shall come to the meetings well equipped to act intelligently on all important legislation.

But manifestly some provision must be made for carrying on the business of the organization during the interval between sessions. The House of Delegates meets only once a year, and there must be some constituted authority for administering the affairs in the interim, and seeing that the legislation passed by the House is made to function. So a Board of Trustees is provided, elected by the delegates, and with a longer tenure of office, and this board is given the power and charged with the responsibility of conserving the best interests of the organization. It is the great administrative wing of our Association.

These bodies, together with the executive officers and the various councils, commissions, committees and sections go to make up our organization, and when all of them function efficiently under the regulations of the Constitutional and Administrative By-Laws, they form a well ordered and adequate piece of machinery for conducting the affairs of this, the great representative dental organization of America.

There is one tendency to which I feel it incumbent to call your attention at this time—a tendency not confined to our own organization, but manifest in the commonwealth at large. There seems to have developed in the American mind a fever of legislative enactment which threatens to make our great government top-heavy and to overwhelm the people in confusion and uncertainty. To make too many laws is even more detrimental than to make too few, and when it is recalled that last year alone there were proposed in this country 38,844 laws, and that out of this number 10,809 were actually enacted, the result must be left to the imagination, because no finite mind can grasp its significance nor predict its results. This riot of legislation is really a more serious matter than is apparent on the surface. It is not only a perversion of legislative intelligence and a case of common sense gone mad, but it also has a dangerous element which should "give us pause," and invite our most deliberate contemplation. It is not within the power of the average citizen to keep himself informed on the new laws that are continually being placed on our statute books, and it is altogether doubtful that the most

observing and conscientious business man entering his office tomorrow morning knows whether or not he is conducting his affairs in accordance with the provisions of the law. In fact, we are told that even the lawyers themselves, whose function it is to become accurately informed on all new legislation, are wholly unable to keep pace with the avalanche of laws that are continually pouring in on them.

There is only one result to all this—a growing contempt for law and a brazen indifference to its violation. Constituted as humanity is today, it is inevitable that our citizens shall rebel against too much legislative regulation of their affairs. Rightly or wrongly, they resent it, and the consequence is that they openly flout the law with apparently no compunction. This is demoralizing in the extreme, and it is firmly believed that it has a direct bearing on the appalling wave of crime that has been sweeping over our land in recent times. But while this is a reason, it is no excuse, for law violation. To violate the law is not to remedy the condition. Better far to follow the principle advocated by the great American Emancipator in whose natal state we are meeting today. It was the immortal Lincoln's theory that a law should be obeyed, and if it was a bad law it should be repealed. That principle is the basis of responsible government and good citizenship, and every boy and girl should be brought up on that doctrine. It may be remarked parenthetically that if this principle were put in action, it would keep some of our legislatures busy for the next few years repealing laws—and the country would be the better for it. There is a common sentiment abroad in the land that the American people are suffering today from too much legislation, and an exaggerated conception of the sentiment of our citizens was recently expressed by one of them when he said: "If all our legislative bodies in this country—Congress and all—should adjourn for ten years, we would be better off."

In our own organization, there is a similar though less apparent danger. We must avoid loading ourselves down with too many regulations lest our machinery become top-heavy and cumbersome. The prime function of this Association is the furtherance of scientific knowledge, and the promotion of the welfare of the people. The shortest and surest means by which we may achieve this end is preferable; and the less complicated our machinery is the more certainly and expeditiously shall we arrive at results. There is a growing tendency to complicate all our professional processes, and, in this organization, unless we have a care, we shall dissipate our energies in the endless minutia of parliamentary regulations, and fall short of attaining the most certain and rapid scientific advancement, which is, after all, our destined and most cherished goal.

DENTAL EDUCATION

In line with the foregoing, we have need to consider carefully the present situation with reference to our dental educational methods. It would seem appropriate for this Association to take cognizance of the tendencies in our educational systems, and to try, if possible, to point the way to a more stable condition. There are so many suggested plans today for educating young men and women in the science and art of dentistry that it is introducing an element of confusion in our ranks which does not make for constructive

and certain advancement. It is not only that there are differences of opinion—these are certain always to exist—but that some of these differences are so fundamental that they cannot be reconciled. This is apparent in the fact that, after repeated conferences of the deliberative bodies who have this matter under advisement, there seems today as great a disparity of opinion as ever. Let us review briefly some of the suggested plans.

One plan is known as the two-three plan—two years of college work and three in a professional school. Another advocates one year in college and four years in the professional school; another, two years in college and four in a dental school; another, five years in the professional school after graduation from high school; and still another embraces the present curriculum of four years in a dental college after graduation from an accredited high school. It is difficult at this time to predict which plan will eventually be agreed on. One thing is certain: that before any one plan is accepted, there must be a compromise on the part of those advocating the different plans, and today there seems little disposition to compromise, by the various advocates. In fact, it appears improbable that absolute uniformity in educational methods will obtain in the near future, and yet if dental education is to have a status in the minds of the people, there must be some standard established and maintained. It should be the desire of everyone interested in the welfare of dentistry to see advancement made in our educational system. Nothing short of advancement will fit into the trend of the times or conform with the orderly development which all right-thinking men must wish to see consummated. But this advancement must be consistent, and not too radical; in other words, the standards must not be raised too abruptly. We must not erect a Chinese wall around the entrance to dentistry and bar out all but the favored few. We must make provision for the education of a sufficient number of dentists to take care of the people adequately, and this means the common people as well as the élite. Any system which makes dental education too exclusive will not long be tolerated by the people, who will appeal to our state legislatures and seek redress through legislative enactment. The people of any community seldom rise up against regulations which have for their object a better preparation of professional men and women to take care of them as long as these regulations do not reach the point of exclusiveness and class favoritism. Our people are essentially a pragmatic people, and while they are inclined to show great tolerance of restrictive measures up to a certain point, the moment that point is reached, they are not slow to assert themselves in rebellion and redress. Therefore, the temper of the people must always be reckoned with in formulating our educational policies, and it will not do for our commissions and committees to content themselves with merely sitting around a table and theoretically making regulations which appeal to them as proper and ideal, without due consideration of their ultimate effect on the people. There has been too much of this impractical and abstract reasoning, and not sufficient study of the probable results when the theories thus evolved have been subjected to the alembic of actual experience. It is a temptation to suggest at this time that

we need more practical men and fewer theorists on all those deliberative bodies which today are directing the destinies of dental education. This is in no way intended as a reflection on the personnel of any of our commissions, nor as an attack on their integrity. It is merely meant to infer that one requisite for a just decision on the most effective dental educational methods is that those who are charged with formulating those methods should have had at least a reasonable acquaintance with the problem as presented through the medium of practical experience as dental teachers. In no other way can they adequately grasp all of the complex angles of this most intricate subject, and be in a position to evaluate properly the desirable or undesirable features of any system.

RECIPROCAL RELATIONS BETWEEN STATES

Always and forever, this question of reciprocity is appearing on the horizon of dental thought, and it is one of the most difficult with which we are called on to deal. There is no question of the fundamental equity and justice of the general principle of reciprocity. Anyone who denies this at once advertises himself as provincial and narrow-minded, and yet, in practical application, it is found that there are two sides to this as there are to most great questions of the day. As long as there is such a variance in the educational and licensure requirements of the different states, it is hardly logical to expect universal reciprocity, and the first great step toward establishing reciprocal relations between states is to secure more uniform educational standards, throughout the land. To this extent, and with this in mind, the efforts of our educational bodies are worthy of all praise, and the entire profession will unite in a common chorus of acclaim when they have succeeded in their endeavors to bring this about.

But there is a certain tendency with some of our states which, in recent times, seems to be assuming a sinister aspect. Our Federal Constitution granted to the various states certain rights and privileges which, in the main, have been benign and beneficial, among which was the regulation of its internal affairs, and its police powers. But every power and every privilege granted to humanity are subject to abuse, and it is not without the pale of ordinary experience to find state legislatures doing foolish and detrimental things. The moment they begin to enact laws that tend to work a hardship on, and to discriminate against, the citizens of other states, they are treading on unworthy and dangerous ground, and that is precisely what some of our states are doing now in their legislation regulating the practice of dentistry. To pass a law which requires that a candidate for licensure must be a graduate of some institution within the limits of the state, or must conform to certain regulations which are characteristic only of the institutions in that state, and out of accord with the established order of things in other states, is not only unequal and unjust, but it is also wholly un-American. The framers of our Federal Constitution never contemplated any such abuse of power on the part of state legislatures. This is a species of exclusiveness which is not at all to the credit of the state passing such legislation, and in so far as the dentists of that state foster this kind of legislation they are open to the charge of narrowness and a selfish indifference to the rights of others.

Dentists as well as legislators should

remember that we are living in a great Federation of States, and that no one state has the moral right to discriminate against the citizens of any other state by erecting a barrier of exclusiveness around it and drawing its skirts to itself in a holier-than-thou attitude. What would be thought of a state today if it attempted to erect a tariff wall against the admission of goods from other states? Even if not prohibited by the Federal Constitution, an act like this would draw to the state attempting it such a volley of protest from all the other states that it could never exist in a neighborly way beside them. If this is true of commerce and in the distribution of commodities, how much more should it apply to the dispensation of humanitarian professional service. If this spirit of provincialism is permitted to prevail in many of the states, it will drive us farther and farther away from reciprocity, and leave us a divided and segregated profession. And this is a consummation devoutly not to be wished.

THE NATIONAL BOARD OF DENTAL EXAMINERS

In a laudable effort to solve one phase of the reciprocity question, an organization has been formed known as "The National Board of Dental Examiners." The organization committee was appointed at Dallas in 1924, consisting of five representatives from the National Association of Dental Examiners, five from the American Association of Dental Schools and five from the American Dental Association. This committee has been working on a constitution and by-laws for the organization, and deserves great credit for the progress made. The central idea of this board, as stated in the preamble to the proposed constitution, is as follows:

> To provide for the admission of qualified persons to the practice of dentistry in any state, territory or dependency of the United States without further examination by licensing boards thereof, except as required by their respective state laws, by means of an examination and certification, acceptable to such boards, in lieu of their own, and to elevate the standard of qualification for the practice of the profession of dentistry.

This a movement which has within it the germ of great possibilities, and, if consummated with the cooperation of the various state bodies, it will go a long way toward solving this perplexing question of reciprocity. The interest of the profession at large is hereby strongly solicited in this important matter.

THE TENDENCY TOWARD SPECIALIZATION

When dentistry began to extend its activities beyond the mere filling and extracting of teeth and the insertion of dentures, and when our technical processes became more and more intricate and exacting, it was soon discovered that no one individual could become expert in every department of our service, and thus specialists were born. Through their agency dentistry was made to develop in a way never dreamed of by our pioneers, and we owe a lasting debt of gratitude to the energy, the concentration and the genius of these men. In the perfection of their technic and in the ingeniousness of their methods, they have compelled the admiration not only of the profession itself but also of the outside world, and they have done much toward giving dentistry a higher status in the eyes of the people.

But there has developed another and a less alluring angle to the situation. The inevitable tendency in too much

concentration on one thing is narrowness of vision, and our specialists have not escaped this limitation. In a complicated organism such as the human system, there is an interrelationship between the various parts which must be reckoned with in any adequate comprehension of the factors which make for health or disease, and this our specialists sometimes seem to forget. Their constant concentration on a single part soon makes them assume that this is the only part, and the consequence is that the patient is not always well served. Their vision becomes warped and their judgment biased, and too frequently their decisions are detrimental. One feature of this is unfortunate. Everything else in the entire physical economy is made subservient and secondary to their own particular field. It is only natural that this should be so. If a man specializes in radiography and exodontia, it is difficult for him to see that every affected tooth is not an enemy to mankind. He finds no virtue in the possibility of treating and saving such teeth, even though it is a demonstrated fact that literally millions of these teeth have been successfully treated and saved for many years, to the great benefit of the patient. The fact that he does not treat teeth causes him to lose faith in the efficacy of treatment. If he sees one case in which treatment has failed, it is sufficient to convince him for life that treatment is futile. And this conviction is conveyed, consciously or unconsciously, to every patient who comes to his office. This is only one phase of the unfortunate narrowness which creeps into specialization. It would be well if every specialist were first a general practitioner, and thus equipped for a wider comprehension of all the factors which are likely to enter into the manifestations of disease in the mouth, and thereby able to render a more intelligent service.

Another unfortunate feature of specialization which applies as well to medicine as to dentistry is the confusion which it is introducing in the public mind. If anything is wrong with a patient today, he is driven about from specialist to specialist till, utterly wearied with conflicting opinions, he loses faith in professional men, and sometimes in humanity at large. And he cannot be blamed. With all the splendid achievements of our specialists, there has never developed anything half so fine in professional relationship as that which existed between the old family physician or family dentist and his patients. It was a relationship which meant more than a mere professional association—it was a close and intimate personal friendship in which confidence, loyalty, and goodwill supplanted all the hard and fast rules of daily life. In its best traditions, it forms one of the brightest chapters in all human experience, and, within its given sphere, it demonstrated the highest conception of loving kindness and faith in the common brotherhood of man. While today there is urgent need of specialists, there is still a more urgent need of general practitioners of both medicine and dentistry.

THE SEVENTH INTERNATIONAL DENTAL CONGRESS

In the city of Philadelphia in August, 1926, there is to be held the Seventh International Dental Congress. On that occasion, the dentists of America will be hosts to organized dentistry the world over, and the members of the American Dental Association in particular should exert themselves to

the utmost in order that our visiting colleagues from foreign lands may be assured not only of a hearty welcome, but also of a scientific and literary program of such character that those coming from a great distance may feel well repaid for their trouble.

The advent of the Congress will place on our incoming officers an added responsibility. For the ensuing year, they must think in terms of internationalism rather than nationalism. It will also be their function to demonstrate to the world the best traditions and principles of American dental practice. It is contemplated in the general plan of the Congress, to place one entire day's program exclusively under the direction of the officers of the American Dental Association, which in itself should put them on their mettle to produce the best there is to offer in organized dentistry.

We bespeak for the Congress officials the cordial cooperation of every loyal member of the American Dental Association in their arduous task of carrying this Congress to a successful issue. It will be recalled that the Sixth Congress, at London, in 1914, was interfered with by the breaking out of the war, and, after the interval of twelve years, there must, in the natural order of things, be many changes in our clinical methods as well as in our general professional points of view. These changes will all be the subject of deliberation at the coming Congress, and, in the light of what were some of our prevailing opinions in 1914, certain of them will seem almost revolutionary. It is expected that, at this Congress, there will be a proper evaluation of the various theories that have been advanced during the interval since 1914, and that dentistry will thereby be placed upon a more stable basis.

At the recent meeting of the Fédération Internationale Dentaire in Geneva, in August, 1925, the officers of the Seventh Congress made a report on the general plan of the Congress and the progress thus far made, and, on action of the Fédération, the plans were approved. The attendance from abroad promises to be large, and everything at the present time augurs well for the success of the meeting.

CITIZENSHIP

In every representative organization of professional men and women such as the American Dental Association, there is an entity and influence beyond that confined solely to the particular field of its special activities—there is its relation to the great world of thought and action which goes to make up what we call modern society. Coming as we do from every state in the Union, and representing, as we should, at least a respectable average of intelligence and responsibility in our various communities, it becomes incumbent on us to give some thought to our obligation as citizens of this great commonwealth. It therefore seems altogether appropriate that, at our annual gatherings, we make some reference to this matter of citizenship, which, after all, in the exigencies of our daily lives, has an important bearing on our ultimate happiness and the happiness of those about us.

Never in our entire history—not even in the shadowy days of the great World War—was there a more urgent call for seriousness of thought in connection with our duty to society than there is today. We see manifest from one end of the land to the other—

particularly in our great centers of population—an apparent loosening of our moral bonds which threatens to place in jeopardy the very foundations of responsible government. The prevalence of crime, which has increased in alarming proportions, is only one manifestation of the general disintegration of society. One of the unfortunate features of the present crime wave is the apparent indifference to it on the part of the average citizen. From bootlegging to bombing, and from organized and systematized mendicancy to murder, it is all taken as a mere matter of fact. As long as crime is blinked at by society, it will increase; and when the ordinary individual who carries about with him the badge of respectability openly violates the law without apparent compunction, it is the beginning of a serious disruption of our body politic.

Attempts at the punishment of crime and the reform of society are spasmodic and inconsequential. Crime is seldom adequately punished, and reforms are ephemeral. This is not intended as a sweeping indictment of society at large: it is the mere statement of a patent fact. There are several causes for this state of affairs, which need not be considered here. What concerns us most, at this time, is the remedy—and the remedy is this: Not till public conscience is aroused to the enormity and danger of law violation, and not till the people themselves awaken to the seriousness of their own responsibility in the matter, can we ever hope to achieve reform. Public opinion rules in all great emergencies, and, after all, it is the voice of the common people which dictates our civic policies. The trouble is that the average citizen does not look on these matters as his concern. At all times and in every way, he avoids the issue with a smug complacency, assuming that the responsibility of regulating the moral status of his community rests on someone else—someone remote—someone—he knows not who it is—but not himself. If you ask him who should regulate these affairs, he will wave the hand and generalize. And this is where the fault lies. From the day that Cain raised the question, "Am I my brother's keeper?" till now, it has ever been the same.

You men and women of the American Dental Association, it is upon such as you that the real responsibility rests. You represent the average citizen—yes, even the more intelligent citizen. It is your sacred duty when you go back from this meeting into your various communities to carry with you a new conviction and a new resolve. Buoyed by the courage and inspiration which must come to you from association with so many others of your own calling, you must consecrate yourselves to a higher service and a broader vision—a service that shall extend beyond the bounds of mere professional practice, and lead you to the performance of all those tasks which go to constitute the essence and the substance of what we know as good citizenship—a vision which shall point the way to a higher conception of life and its possibilities, and reveal to you a realm of rarer worth and purer motive, where the sons of men may bask in an atmosphere of happiness and hope.

THE PATHOLOGY AND DIAGNOSIS OF THE BASIC LESIONS OF CHRONIC PERIODONTITIS

By JOHN OPPIE McCALL, B.A., D.D.S., F.A.A.P., New York City, and HAROLD KEITH BOX, D.D.S., Ph.D., F.A.A.P., Toronto, Canada

(Read before the American Academy of Periodontology, Atlanta, Ga., Oct. 7-9, 1924)

IN THE early days of medical science, study of disease was based entirely upon the observation of clinical phenomena. But when Pasteur began his epoch-making work on fermentation, he was aided, and, in fact, his discoveries were made possible, by the miscroscope. This instrument, crude as it was at that time, was nevertheless powerful enough to render visible the minute organisms responsible for fermentative processes. From the study of micro-organisms to the study of minute anatomy was but a step. The microscope, ever since Pasteur's day, has played a more and more important part in the study of disease until at the present day, we find in some quarters a tendency to place greater reliance on the findings of the microscope than on the findings of the clinic. We would at this time, therefore, emphasize the necessary interdependence of each branch on the other. Specimens taken for microscopic study must be given the most careful scrutiny before removal from their locus in the body in order to determine the clinical facts. This method has been followed with all the specimens studied in connection with this paper. It can be accepted, therefore, that assertions regarding the conditions found have been based upon meticulously careful clinical observation.

Regarding the subject of this paper, it may be well to call attention to the fact that the discovery of rarefying pericementitis fibrosa, and certain peculiarities incident to its development, compel us to focus our attention more sharply than ever before on the detection of the earliest discernible periodontal lesions. While we have individually given much attention to the etiology of periodontal disease, our studies, both clinical and microscopic, have shown us the unwisdom of making further and conclusive statements on this phase of the subject at the present time, notwithstanding the dilemma of the practitioner, who must know his etiology before he can prescribe treatment. It may be proper to state, however, that work on etiology by one of us is now under way, and will shortly be issued in a bulletin of the Canadian Dental Research Foundation. We must know the nature of the disease before we can intelligently study its cause, and it is with the hope of elucidating the nature of periodontal disease that this paper is presented.

Since the material herein discussed has already been published[1] it seems well at this time to emphasize and elaborate on certain parts that were necessarily described somewhat briefly in this former publication.

1. Box, H. K.: Studies in Periodontal Pathology, Bull. No. 7, Canadian Dental Research Foundation.

PERIODONTITIS

The term periodontium is used to designate the supporting tissues of the teeth. The three essential tissue components of the periodontium are the gingivae, the pericementum and the alveolar process. By the term periodontitis, an inflammation of the periodontium is denoted, and a disease so designated involves all three components. Upon this distinct basis, the term makes for simplification and accuracy in terminology. It excludes certain lesions of the periapical tissues, such as abscesses and granulomas, because, while the pericementum and alveolar process are involved in these lesions, the gingivae are not.

Upon clinical and histopathologic findings, inflammation of the periodontium may be classified as follows: (1) acute periodontitis (fusospirillary); (2) chronic periodontitis, simplex, with or without pocket; or complex, with or without pocket.

From pathologic and clinical points of view, chronic periodontitis, of the pocket-producing types, may be divided, as seen in the foregoing classification, into two main divisions, simplex and complex.

It may be proper at this point to present the clinical differences between the simplex and complex types, since they differ widely from each other in certain important features. In the mature lesion of the complex type, we find considerable congestion of the soft tissues, a deep pocket extending apically along one or more surfaces of the root, perceptible pus formation and calculus, and varying mobility of the tooth. This is in fact usually pointed out as the typical lesion of so-called pyorrhea alveolaris. As a matter of fact, it exemplifies one type only, the complex. Quite as typical in its way is the other form of chronic periodontitis, the simplex. Here, we find a tooth fairly firm, except in the latest stages; surrounding tissues exhibiting little or no clinical evidence of inflammation; receding gingivae; no visible pus; little or no perceptible calculus, and pocket absent or very shallow. This type is commonly found in cases of nonocclusion, in which function is lacking or is, at least, subnormal.

Either type of chronic periodontitis, is the resultant of certain preceding lesions which, by their coalescence, constitute a distinct pathologic composite.

The order in which these lesions occur in the mature form of the simplex type is as follows: (1) chronic gingivitis, cemental (pocket in cemental gingiva); (2) infective osteitis (rarefying and condensing); (3) chronic pericementitis (pocket extension into the pericementum).

In the mature form of the complex periodontitis, there are to be found two principal lesions: (1) rarefying pericementitis fibrosa; (2) infective periodontitis.

Infective periodontitis is, in its turn, made up of three constituent lesions which have appeared as phases in the following order: (a) chronic gingivitis cemental (pocket in cemental gingiva); (b) chronic pericementitis (pocket extension into the pericementum); (c) infective osteitis (rarefying and condensing).

In the simplex type, the gingival lesion, the dominating one, is not so extensive or rapid in pocket development as in the complex type. It represents a simple reaction to bacterial invasion whereby, through local lowered resistance in the gingival tissues, infection has been established. Consequent on

the loss of gingival attachment, absorption of the alveolar crest takes place, again an inflammatory reaction to toxic agents. In the majority of cases in which superficial causes are the dominating ones, progress is fairly slow because of the fact that the pericementum is high in resistance.

In the complex type of chronic periodontitis, the formation of the pocket is a phenomenon preceded by much more complicated and profound changes than occur in a simple gingivitis. The ideal requirements for rapid and deep pocket extension are alveolar resorption, lowered resistance in part or all of the pericementum and the establishment of gingivitis. Disturbance of equilibrium, as manifested in excessive function or traumatic occlusion, while but one etiologic factor in the production of the required changes in the pericementum and alveolar process, is the most important one. In other words, it is a factor that is invariably present in the clinical picture of cases of chronic periodontitis complex. We recognize the fact that other pathogenic factors undoubtedly contribute to the production of the disease, as evidenced by the occurrence of patent traumatic occlusion without clinical evidence of periodontal disease. We furthermore notice a variation in the ages at which different individuals manifest the symptoms of disease, although having similar occlusal inharmonies. Without making further comment on this point at present, we can make the statement that the discovery of traumatic occlusion in any mouth should be the signal for action looking toward its relief or at least the institution of a more frequent and searching examination for the symptoms of disease.

HISTOPATHOLOGY OF THE BASIC LESIONS OF CHRONIC PERIODONTITIS COMPLEX

Rarefying Pericementitis Fibrosa.—This is a chronic and progressive lesion of the pericementum that results in the rarefaction and destruction of alveolar bone. The process consists of the formation, in the pericementum, of a new tissue that, on the one hand, changes the normal arrangement of the pericemental structures, and, on the other, replaces the bone substance of the alveolar process. These changes in the pericementum and the alveolar bone are concomitant lesions. This new tissue subsequently assumes the form of a fibrillar connective tissue. In this new tissue, the reaction around the blood vessels is a conspicuous feature. There is a proliferative change of the endothelial cells lining the blood vessels, leading, in many instances, to partial or complete occlusion of the vessel lumen. Endothelial cells are to be seen, also, in the new tissue surrounding the blood vessels, accompanied by occasional lymphocytes and plasma cells. A few fibroblasts are present. In other words, there is manifested a chronic and progressive tissue response wherein new fibroblasts make their appearance during the progress of a very low grade of chronic inflammation.

In the production of this reaction, however, there is no significant development of new capillaries, and the tissue cannot be looked on as typical granulation tissue. Nevertheless, there has taken place a new growth of tissue, its various elements constituting at times a diffuse new structure, and, at other times, nodular and irregular masses of new tissue growth.

The rarefaction of the alveolar process is the result of involvement, by the

new tissue, of the osteogenetic tissue on the exterior of the bone, and the setting up of the mechanism of bone absorption. These areas are manifested by great cell activity. However, other areas of bone loss seem to be associated with nutritional disturbances caused by this new tissue, and atrophic changes follow in the bone. Starting with a fairly simple process, the final rarefaction of the bone is a complicated melting-down process.

As stated previously, the reaction around the blood vessels, characterized by the presence of endothelial cells, along with occasional lymphocytes, plasma cells and fibroblasts, is the prominent feature of this new tissue. Through increase in size of masses of this tissue lying in the body of the pericementum, or through proximity to the surface of the alveolar bone of the blood vessels manifesting the reaction, these same cells encroach on the bony surface. Accompanied by osteoblasts and osteoclasts, the absorption of bone is seen to take place, with the formation of little baylike depressions into the surface of the alveolar wall. Into these inlets, the new tissue extends in finger-like projections along the blood-vessels, carrying inward reactions similar to those seen on the surface, and producing within the bone an internal rarefaction.

In the disease rarefying pericementitis fibrosa, the inflammatory changes noted in the gingival tissues are found to be extremely superficial, and they bear no relation to the changes that are observed in the pericementum. Up to the present, no relation of the pericemental changes to bacterial infection has been demonstrated. It is to be recognized that a varying infiltration by lymphocytes and plasma cells is constantly encountered in normal conditions in the mouth and surrounding parts. These inflammatory reactions vary from time to time, and seem to be found frequently in response to mild superficial irritations from foodstuffs and temperature changes. There is, in other words, no definite proof in the microscopic picture that this disease was induced by infection, despite the appearance of a small number of plasma cells and lymphocytes. On the other hand, there is new evidence at hand that seems to indicate clearly that the rarefying pericementitis fibrosa is a direct factor in the formation of the pocket, or, in other words, is the actual cause of pocket formation. If this is so, the detection of the fibrosa at the earliest possible moment becomes one of the paramount and outstanding duties of the dentist.

Study and comparison of the work of one of us (H. K. B.) in 1916 and 1924, Noyes in 1920 and Kritschevsky in 1924, together with the clinical observations of Stillman and others, makes it evident that the full etiology of this disease condition is yet to be determined.

In 1916, one of us (H. K. B.) submitted an essay, accompanied by photomicrographs, in a competition conducted by the Canadian Dental Research Foundation. The competition was judged by Drs. C. N. Johnson, Edward Kirk and J. Leon Williams. Among other slides shown was one numbered 157, which was submitted to show the morphologic changes occurring in the tissues in a case of chronic gingivitis in a patient, aged 54. This was published in the *Dental Summary* in 1916. The same slide was recently republished in an article by McDonagh on bridgework from the periodontal standpoint. The fact was noted (by H. K. B.) that irritation, which he at that time attributed to the action of a clasp, predisposed to infection. He said "Following

infection at the base of the subgingival space, part of the pericementum is destroyed. A very important result of inflammatory conditions of this type is absorption of the crest of the alveolar process." The slide in question showed pericemental changes and also bone absorption both at the crest and along the inner wall of the alveolar bone. More recent researches have demonstrated that the pericemental changes are a part of a complex pathologic process in which the normal arrangement of the pericementum is changed and alveolar bone is destroyed by a process in which it is replaced by inflammatory tissue, and it is also destroyed by a process of nutritional atrophy.

Noyes[2], describes perivascular changes in the pericementum that are suggestive of the changes seen in rarefying pericementitis, since described by one of us. Noyes believes them to be "finger-like extensions of inflammatory tissue stretching deeper and deeper into the tissues," and attributes their origin to infection at the gingival margin. Finding that the inflammatory reaction occurred in the same position as the lymphatic vessels, he says that "the infection seems to have followed the lymphatics into the peridental membrane." His specimens show a higher degree of inflammatory reaction than does rarefying pericementitis fibrosa in its early stages, yet he makes no mention of bone changes. His work is unquestionably important, however.

Kritschevsky and Seguin[3] have attributed changes in the pericementum that suggest rarefying pericementitis to the penetration of this tissue by spirochetes "by the help of interstitial ..... orrhages that dissect the connective tissue fibres." They state that there is no doubt that the spirochetes find in collagenous tissue (which occurs around blood vessels) a food that is particularly suitable from the point of view of their multiplication.

The later work of one of us (H. K. B., 1924) now makes it clear that in many instances, infection plays no demonstrable part in the inauguration of the early lesions of periodontal disease. In view of all the evidence that has been presented, it seems unwise at this time to make dogmatic statements regarding etiology.

The lesions of rarefying pericementitis fibrosa localize themselves most often in the periodontal tissues of teeth that are in traumatic occlusion, or overfunction, and appear to originate in pericemental tissues that are systematically subjected to abnormal occlusal stress.

Any tooth under occlusal stress, and acted upon by forces in equilibrium, presents to us the ideal picture of physiologic occlusion. While physiologic occlusion is based upon a mechanical equilibrium, that is, a condition in which the force of resistance offered by the alveolar process is equal to the occlusal stress directed through the tooth, the force of resistance maintained by the alveolar bone is probably dependent on a state of equilibrium existing between the calcium content of the bone and the calcium content of the blood. It has been demonstrated by Wells that the calcium salts in bone are in a condition of flux, and that, if the body requires increased calcium, as during pregnancy, these calcium salts can be drawn on. While occlusal traumatism seems to serve as the main factor in the localization of the lesions of rarefying pericementitis fibrosa, certain

2. Noyes, F. J.: "Pathologic Changes in the Peridental Membrane." J.N.D.A., 7: 123 (Feb.) 1920.

3. Kritschevsky and Seguin: Unity of the Oral Spirochetoses, Dent. Cosmos, June, 1924.

conditions in which the body is being robbed of its normal supply of calcium seem, from a clinical standpoint, to accelerate the process of rarefaction.

When rarefying pericementitis fibrosa is manifested as a pure type of periodontal disease, the phenomenon is usually observed in which there is a parallelism between alveolar resorption and gingival recession; in other words, recession of the gingival tissue making parallel progress with the bone resorption. The parallelism may be disturbed, however, by the establishment of infection in the gingival tissues. With the evolution of a superimposed, infective periodontitis, through consequent pocket formation, there is brought about the pathologic composite, chronic periodontitis, complex, which will be more fully described later. And there is much evidence to support the point of view that, in the production of this infective periodontitis, of paramount importance as a causative factor is the primary establishment of the disease rarefying pericementitis fibrosa.

The typical sites in the alveolar process of the rarefying phase of this disease are as follows. (1) the parietal wall of the alveolus; (2) the crests of the alveolar process, including the process between the roots of bicuspids and molars; (3) the crests, together with the periapical bone (the tooth situated in its alveolus furnishes a good example, in many instances, of a lever of the second class); and (4), the periapical bone.

The importance of early diagnosis of rarefying pericementitis fibrosa cannot be overemphasized. The primary lesion consists in the formation in the pericementum of, a new and pulplike tissue that replaces the normal pericemental structures, with interference of their normal functions. This is often manifested clinically by a slightly increased mobility of the tooth in its alveolus, due probably to the peculiar yielding character of the new tissue.

Infective Periodontitis.—This is a composite disease, made up of three distinct diseases, each of which has made its appearance in the tissues and has blended into the succeeding disease, each maintaining, however, its characteristics throughout the duration of the pathologic complex. Even rarefying pericementitis fibrosa, which seems to have a causative relationship to infective periodontitis, persists as a part of the disease composite, and maintains for a long period of time its noninfective character.

Infective periodontitis begins as a chronic inflammation in the cemental gingiva. It is in this tissue that pocket formation begins.

Because of the fact that these lesions are usually initiated as subacute inflammations, the classic signs of acute inflammation are lacking. This most important pathologic process is therefore extremely difficult to diagnose clinically, until sufficient separation from the cementum has occurred to permit of measurement by the probe.

It will be recalled that we are considering a process that is leading toward a separation of the tissue of the cemental gingiva from the cementum. This separation that creates the so-called pocket results in a denudation of the cementum. A striking feature of this process is the rôle played by the epithelium at the base of the gingival crevice. This epithelium exhibits a very constant tendency to proliferation and extension apically. The pocket is usually formed in one of two ways. Either the epithelium extends for some distance along the cemental surface and subsequently becomes separated from it or, by a progression of the inflammatory process, ulceration is established, with a

consequent denudation of the cementum. In the first instance, ulceration occurs, if at all, as a secondary phenomenon to the tissue separation. In the second instance, tissue separation takes place primarily through the ulcerative process. In the latter case, any proliferating epithelium at the base of the crevice will usually be included in the ulceration. Whether ulceration is primary or secondary in sequence, the tendency is for the process to become reduced to a chronic nonulcerative inflammation, with the epithelium covering the separated soft tissue.

Chronic Pericementitis.—Pericemental pocket. A pericemental pocket is an extension of a cemental-gingival pocket into the pericementum. It will be recalled that the pericementum is that tissue which fills the space between the root of the tooth and the wall of the alveolus.

The pericementum is subject to circulatory disturbances due to interference with its normal function. It thus may become subject to infection, which may extend into it from the cemental gingiva. Previous to infection of the pericementum by extension from the cemental gingiva either with or without pocket formation, the crest and associated alveolar process has become resorbed through the rarefying pericementitis fibrosa, already described. The teaching of Black is that bone absorption occurs secondarily to the detachment of the fibers which had been originally inserted into it, and that "detachment of the peridental membrane from the cementum is the principal factor in causing loss of the bone."[4] If bone absorption occurred in this sequence, it would necessitate the extension of the pocket between the tooth and the adjacent alveolar wall.

While bone absorption frequently takes place in such a way as to leave a considerable amount of bone above the base of the pocket, the significant fact is that the bone which constituted the original alveolar wall of the affected tooth is invariably resorbed in advance of the extending pocket. Furthermore, the bone which remains above the level of the base of the pocket, when viewed under the microscope, is seen to be so far removed from the affected tooth as to be well beyond the confines of the region in which the pocket was originally formed.

Examination of more than 600 specimens of pocket formation in its relationship to bone absorption has failed to reveal a single instance in which the pocket extends between the root of the tooth and the original alveolar wall.

The process by which a pocket is formed in the pericementum is identical with that which previously led to pocket formation in the cemental gingiva.

Owing to the progression of the inflammation, there is an active proliferation of epithelium apically along the cementum. As in the case of cemental-gingival pocket formation, the pathologic process may exhibit either separation of the proliferating epithelium from the cementum, or an ulceration at the base of the advancing pocket. In either case, the significant fact is the constant tendency, and one which is successfully carried out in the majority of cases, for this epithelium to cover the separated connective tissue. When a large number of specimens are examined, it is surprising how little ulcerated tissue is to be found even in the deepest pockets, or in contact with large masses of calculus.

The cementum underlying the pocket,

4. Black, G. V.: Special Dental Pathology, Page 170.

from which the soft tissues have detached, always presents a septic surface. This is due to the frequent occurrence of serumal deposits, to the retained ends of the principal fibers in the insertion layer, and occasionally to small remnants of necrotic pericementum adhering to the cemental surface. There is no microscopic evidence to show that in the average case the cementum is penetrated deeply by bacteria. That such penetration may take place, is, however, shown by numerous photomicrographs.

We see no reason, from the biologic standpoint, to agree with Black's statements regarding the impossibility of securing reattachment of the overlying soft tissues to denuded cementum. Black has laid down a postulate which may be summed up in the following sentence. "The key to the treatment of suppurative pericementitis is in the statement that suppurative detachments of the peridental membrane are permanent detachments."[5] On the contrary, clinical evidence has been accumulating for years to support the contention that reattachment is possible. We are now in a position to bring forth histologic evidence that supports the claims of prominent clinicians and controverts the doctrine advanced by Black.

Not only has it been found that reattachment of the surrounding soft tissue to the cementum may be induced, but also evidence is not lacking that regeneration of alveolar bone may take place. The supposed hopelessness of the building up of bone can readily be demonstrated to be without foundation; in fact, many periodontists have offered roentgenograms that furnish indubitable proof of bone regeneration. Some of the author's radiographs give evidence of a complete restoration of the alveolar crest, a type of bone regeneration usually regarded as least likely to be accomplished.

In view of the evidence submitted, it is interesting to refer to the pessimism of most writers on this subject regarding the possibility of cure in a mature case of chronic periodontitis, complex. That this pessimistic attitude has not been justified may be demonstrated through a review of the following fundamental postulates, whose truth we believe has been established in this paper.

1. The progressive nature of both of the basic lesions (rarefying pericementitis fibrosa and infective periodontitis). It will be recalled that the regressive changes in the alveolar bone are secondary to progressive changes in the pericementum.

2. The demonstration that reattachment of the soft tissues to the cementum may be induced.

3. The demonstration that rarefaction of the alveolar bone can be arrested, and that, in many cases, an actual regeneration of the alveolar bone may be induced.

These three postulates may be summed up in the form of the following proven hypothesis: Chronic periodontitis belongs in the category of curable diseases.

Infective Osteitis (Rarefying).—It has been stated that alveolar resorption has taken place, without infection and in advance of the extension of the pocket. The deepening pocket on account of its sheltered location and its contained débris, serves as an incubator that is particularly favorable to the growth of micro-organisms. Through increased absorption of toxins, and actual infection, the phenomena of infective osteitis are added to those of noninfective rarefaction of the alveolar

5. Black, G. V.: Footnote 4, p. 185.

bone. In other words, the inflammatory process brought about by infection extends to the alveolar bone, and through its contributing factors, e.g., acids produced by bacterial action on the fluids of the environment, products arising from cell destruction, and secretory products of abnormal tissue cells, further absorption takes place.

In the fibrillar connective tissue that has been formed subsequent to the noninfective absorption of bone, there is to be noted an extensive small cell infiltration, which also, in certain areas, has entered the marrow spaces. The activity produced by chronic inflammation in the soft tissues in the marrow spaces or haversian canals results in certain striking changes in the dense basement substance of the bone. As a result of these changes, either the calcified ground-substance is absorbed and replaced by young cellular forms of fibrillar connective tissue or the marrow-spaces undergo progressive reduction in size by new formed lamellae on their walls. These alterations are named, respectively, rarefying and condensing osteitis, which terms simply indicate the local results of inflammation.

The rarefaction of the bone in infective rarefying osteitis occurs by enlargement of the medullary spaces and haversian canals, with consequent disappearance of the spongy bone substance. The soft structures of the bone become very cellular and vascular and are converted into granulation tissue. Throughout this tissue, there is a marked infiltration of lymphocytes and plasma cells. Under the influence of this tissue, the ground substance of the bone becomes absorbed.

A prominent feature of the histologic picture is the marked disturbance of pericemental circulation. The blood vessels are greatly dilated, and, in many instances, the red blood cells have escaped into the surrounding tissues. Such hemorrhages are usually small, but their occurrence, on the other hand, may be widespread throughout the pericementum.

CONCLUSIONS

1. There are two forms of periodontitis, the simplex and the complex. The simplex is characterized by slow progression, shallow pocket formation and little divergence from normal mobility in the early stages. It is dominated by the gingival lesion.

2. The complex form is characterized by more rapid development, formation of a deep and narrow pocket and marked divergence from normal mobility. It is made up of two basic lesions, one prior to pocket formation and one involving pocket formation.

3. Rarefying pericementitis fibrosa is the primary and dominating lesion, having the potential in many instances of inducing pocket formation.

4. So far as has been demonstrated, in rarefying pericementitis fibrosa, there is no bacterial relationship, and furthermore it frequently occurs before gingivitis. While pericemental changes are the fundamental lesions, alveolar changes are the spectacular ones and are diagnosed chiefly by rarefaction signs, as follows:

A. Mobility No. 1. This is a degree of mobility so slight as to escape casual observation. It requires careful manipulation and the application of considerable digital pressure, in many instances, for its detection. It seems to be associated with rarefying pericementitis fibrosa, since, in the disease, varying numbers of the pericemental fibers have been replaced by this soft, yielding, new tissue.

B. Recession of the marginal gin-

gival line. Taking the amelocemental junction as a fixed landmark, it is often found that the gingival margin shows an altered relationship to this line. In the average case, the margin of the gingiva is approximately 2 mm. above the amelocemental line. Recession of the gingival margin toward this line is usually indicative of alveolar crest resorption. For example, a recession of the marginal gingiva that just exposes the amelocemental line will probably indicate a crest resorption of 2 mm. Exposure of the cementum will indicate an increased alveolar resorption of a corresponding degree.

C. Asymmetric recession of the marginal gingival line. In many cases, recession of the gingival margin involves only part of the normal gingival line. This may occur in the median line of the tooth or on either side of this line, thus disturbing the normal symmetry of the curve of the gingival margin. It indicates a localized resorption of the alveolar crest.

D. Recession of the alveolar crest line. The crest of the alveolar process in the average normal case is approximately 2 mm. below the amelocemental line, which has been adopted as a fixed landmark. Disturbance of the normal relationship between these lines is a manifestation of recession of the alveolar crest line. This may usually be detected by careful study of the roentgenogram.

E. Increased radiolucency of the alveolar crest or lamina dura. This is an indication of a rarefaction of the alveolar bone in these locations.

F. Disturbance of normal contour of the alveolar crest. Frequently, the alveolar crest presents in the roentgenogram a slightly eroded appearance, disturbing its characteristic normal symmetry. This is due to a localized resorption of the alveolar crest.

G. Increased widening of the pericemental space. When complete rarefaction of the lamina dura takes place, there is exhibited in the roentgenogram, in certain zones, a definite widening of the line that represents the pericemental space.

H. Mobility No. 2. When the lamina dura is destroyed to any extent about the tooth, there is, of course, an increase in the soft tissue content between the tooth and the remaining alveolar wall. This naturally permits an increased mobility beyond the normal and beyond that designated as Mobility No. 1.

I. Shortening of the crest of the septal gingiva. When an appreciable resorption of the septal alveolar crest has occurred, there will usually take place a concomitant dropping away of the septal gingiva. This will be evidenced clinically by the appearance of spaces between the teeth which were formerly filled with gingival tissues.

5. Infective periodontitis is the superimposed and secondary lesion characterized by pocket formation. Clinically, it is differentiated from chronic gingivitis, cemental, by the difference in pocket depths.

6. The evidence of the microscope as well as of the clinic, beginning with the earliest indications of disease, is that periodontitis, both complex and simplex, is a progressive and not a retrogressive disease, and therefore belongs in the category of curable diseases.

GENERAL PRACTICE AS RELATED TO THE FIELD OF ORTHODONTIA

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OF LATE years, there has been a very noticeable scarcity of orthodontic subjects listed on the programs of our dental society meetings, and in view of the interest displayed by the public in this branch of dental art, the condition is to be regretted. The question arises as to why a lack of interest by the profession has developed, since the many excellent presentations made by orthodontists of unquestioned ability have been listened to by audiences that numbered hardly more than the proverbial corporal's guard. As a result of this lack of interest from within our ranks, the orthodontist has bided his time, until now we find developing, a new factor which is reacting and stimulating the general practitioner in the subject of orthodontia. This new factor is the interest of the public—and the public certainly is interested. If you are at all in doubt as to this statement, you have only to visit the office of any established orthodontist and ascertain for yourself.

It is a healthful sign to note that the programs of two of the largest dental societies, in their most recent meetings, have given way in far more than the usual degree to the subject of orthodontia. Reference is here made to the American Dental Association meeting of last November at Dallas, where eight papers at least were strictly orthodontic, and the meetings were uniformly attended by the largest number of auditors on record for the section of orthodontia; and this present meeting of the Chicago Dental Society, wherein three full sessions are given over to the subject. Again, these are healthful signs.

In view of the layman's favorable regard of orthodontia, it becomes our duty as dentists properly and adequately to care for this new interest and the growing number of patients. Referring once more to the public, it is to the public, by virtue of their granting our license, through the laws, that we owe our privilege or right to practice.

In the preparation of this paper, I have had three thoughts foremost in mind: (1) to present the subject in such a way as to create a deeper and more sincere interest on the part of the general practitioner; (2) to present it in a concise, plain manner, and (3) to enumerate some of the simple principles so that the novice may be guided to a better start in the science and art.

Let it be understood in the beginning that he who elects to become an orthodontist should either avail himself of the advantages offered by a graduate course of instruction—and these are only stepping stones—or undertake a systematic course of reading and study of the prin-

ciples upon which the treatment of malocclusion is founded. Under no condition should he allow himself to be misled into the belief that the successful practice of orthodontia depends on any appliance, or any system of appliances or any mechanical device—they are but the means to the end. No matter how alluring literature on treatment and appliances may be, he will sooner or later see the evil of building on any foundation other than that of study of the principles involved.

IMPORTANCE OF ORTHODONTIA

Quoting from the introduction to Angle's "Malocclusion of the Teeth," seventh edition, we find such sound statements as these:

> Orthodontia is a subject so great, so important, with such possibilities and rewards, that it is ample in itself for the life work of the best minds . . . . Orthodontia when mastered and practiced as a specialty, becomes one of the most fascinating of the professions and gratifying in its practice, having, as it does, a clientele far more nearly ideal than is to be found in any other branch of medicine, composed of patients in health and in the flower of youth—and that, too, of the cultured and affluent. Yet its exactions on the student and practitioner are so great that only those highly qualified in the science can ever hope to truly succeed; but for such there awaits a field almost limitless in extent and in which they will receive prompt recognition.
>
> The opportunities and possibilities of improvement of the features by the proper treatment of malocclusion are so great, and the appreciation of the patients and their friends so genuine when the work has been quickly and intelligently performed, we wonder that a closer study and keener interest in the subject by the practitioner was not long ago awakened, and we are surprised that so few have a proper conception of the possibilities of orthodontia and for the improvement of the individual in speech, health and beauty.

Such statements are extremely alluring and it is well to note that Angle, in his enthusiasm for the work, not only emphasizes the wonderful possibilities, but also places an equal stress on the importance of thorough preparation and continued endeavor.

WHY ORTHODONTIA IS PRACTICED AS A SPECIALTY

The rapid advances in the field of orthodontics have justified its being practiced as a specialty, and the requirements of the service seem to demand this; still, there are conditions indicating that the service should be at times rendered by the general practitioner, in which event there are certain definite things that he should do to qualify himself.

The prospective worker in this field should, first of all, have a knowledge of general dentistry and an inherent desire for further knowledge and skill in the special field. None the less should he have a love for, and patience with, children.

A dentist has every right to practice orthodontia, but let it be said with equal emphasis that he has no right to practice it without a knowledge of its requirements and the development of the technical skill necessary. Both are important factors.

Many of the older orthodontists of the present day are men who have gained their knowledge and skill from long years of experience. A few of them have had the advantage of short special courses of study, which has been the avenue by which numerous younger men also have entered the field. Many of the orthodontists of the future will be recruited from the same ranks, but fortunate indeed are those who can take advantage of the graduate courses now being offered by several of the larger dental schools and covering a full academic year. He who has not a real love for the work and a willingness properly to qualify himself had better be content with some other branch; for, if attracted only by the "glitter" of an orthodontic appliance, he will fall by the wayside.

RELATION OF DENTAL PRACTICE TO ORTHODONTIA

The dentists who practice orthodontia may be classified as: (a) those who treat an occasional case, and (b) those who refer all cases to a specialist. The former should have the same knowledge and skill as the specialist and the latter should be sufficiently informed to judge the work of the man in whose hands his patient is placed. Any dentist may announce that he is making a specialty of this or that branch of dentistry, but the fact must not be minimized that there are varying degrees of skill, even among "specialists," and the practitioner who refers the case should zealously guard his own reputation.

The treatment of malocclusion as a part of general practice is justified, especially in the smaller cities and communities as it is estimated that from 50 to 70 per cent of children suffer from malocclusion, in varying degrees of severity; which indicates the necessity of orthodontic treatment; and it is further evident that many thousands of these children, for very good reasons, cannot have the services of the practitioner who limits his field of operation to this particular line.

Reference has been made to a systematic course of reading. Such a course would be a thesis in itself and cannot be included here. If the student were contented to read the orthodontic literature wherein there is no reference to the mode of treatment, a good start would be made. The opening chapters of the textbooks (as far as the subject of treatment) by Angle, Case, Dewey, Jackson, Lischer and McCoy are all instructive. Such correlated works as Black's "Dental Anatomy," Cryer's "Internal Anatomy of the Face," Noyes' "Histology and Embryology" all have chapters with a direct bearing on the subject of orthodontia.

BASIC PRINCIPLES

Much has been written during the past few years with a view to establishing the fact that tooth movement is a procedure involving much more than mechanical principles only. It appears that much of this literature has been of such a nature that it has failed to reach the desired goal and has fallen far short of the ideals and wishes of the authors.

Tooth movement involves biologic and physiologic factors, and, therefore, growth and development of the tissues involved, with the changes of structure and function incident, must be understood and considered as concomitant with the mechanics of tooth movement.

The development of the denture is but a part in the development of the whole human organism, and the same laws of life, function and growth have applied to the dental tissues as to the whole. Therefore, in the consideration of orthodontic problems, it is a mistake to consider the oral structures alone and to the exclusion of the body as a whole.

The factors involved in this particular phase of the subject are too extensive to find place in this presentation, and the student is referred to the series of lectures "Basic Principles of Orthodontia."[1] Here, too, will be found references to the works of many other writers, having a collateral relationship. After listening to this unusual course of lectures and later carefully reading them, I wondered as to their applicability and practicability in the teaching and practice of orthodontia. There was nevertheless the conviction that we must no longer consider tooth movement as a mechanical problem alone.

When orthodontic measures are resorted to, the treatment must be carried to such a point that the teeth and all associated structures will function in a

1. Johnson, A. L.: Dent. Cosmos, 65, 1923.

natural and normal manner; for then and then only may we expect the denture to perform the physiologic functions required by the human body as a whole.

THE BEST AGE FOR TREATMENT

The problem as to what is the best age for the correction of malocclusion is one that has confronted every dentist, and to answer it involves the consideration of several factors. As a basis upon which to consider the matter, let it be stated that the best time to correct any ailment is at its inception, or at least as soon as it becomes manifest.

The proliferating power of bone cells, an important factor in orthodontic practice, is much greater in the young patient than in those of more advanced age; therefore, if we anticipate an extensive alteration in the dental arches, the supporting structures or the contiguous tissues, it is highly desirable that treatment be undertaken at an early age. The bone building cells in the young subject continue their proliferation for a longer time before assuming their mature form; whereas, in the older subject, the proliferating power is lessened and the cells assume their mature form in a relatively short time. Much has been written on this topic, and, as a more or less concrete statement, it may be said that most experienced orthodontists prefer to start operations at an early age. The mode and the extent of treatment, however, become a matter of careful and mature judgment. Again, stating the proposition in slightly different language, the longer teeth are allowed to remain in malocclusion, the more difficult will be the treatment and the more questionable will be the result, both as to the dental organs themselves and as to the adjacent tissues as well.

Most orthodontists would advocate early treatment in mesioclusion or distoclusion cases, or in such other instances wherein there is, or wherein there is likely to be, a lack of proper facial balance. The successful contouring or building of the bones of the face can be accomplished and controlled with more certainty if undertaken in early childhood. In this instance, "early" may be accepted as meaning from 4 to 6 years of age. In those cases wherein a serious interference with facial balance is not anticipated, I prefer to start early in the transitional period, or at about 6 to 8 years of age.

The transitional period is an extremely important time in the development of a denture, and careful observation plus the application of simple operative procedures by the family dentist, during this time, may do much to lessen a serious malocclusion a little later.

Speculative advice is given too frequently in this day and age. It is inexcusable to delay orthodontic treatment until adolescence or maturity, for by this time irreparable damage may be done. No dentist should expose himself to the criticism that is sure to follow a patient's disfigurement after such advice as "Wait and see what Nature does" or "Wait until the permanent teeth have erupted" or "It's too soon to tell" or "When the jaws are fully grown, there will be plenty of room." An observing, conscientious operator can foretell an impending malocclusion long in advance of its actual development.

There is some question as to what may be considered "early" treatment, as far as the age is concerned. The age of 10 might be considered as early in one instance, but it would be decidedly late for the case that could have been easily corrected at the age of 5. Conversely, a case undertaken at the age of 5 might easily develop into a prolonged course of treatment because of certain intrinsic or constitutional conditions of the patient

over which we have no immediate control. The "best" age for treatment, then, becomes a matter of careful and mature judgment. A recent paper by Dr. Charles R. Baker[2] read before the American Dental Association at Dallas is a valuable contribution on this subject.

IMPORTANCE OF ETIOLOGY AND DIAGNOSIS

In the practice of medicine, the physician endeavors to determine the cause of the trouble and then to prescribe for and treat the patient accordingly. It may be that certain conditions are plainly evident or that his experience is sufficient to enable him to determine the causative factors readily; or it may be necessary to enlist the services of an internist, but in any event he tries to find the cause and then treats the patient accordingly.

In many cases of malocclusion that have been corrected to the satisfaction of both operator and patient, sooner or later the condition has recurred, to the displeasure of the patient and the wounded pride of the operator. In considering this condition, it should be remembered that the dental apparatus is not an organ with a single function, but a complex apparatus with many functions involving not only the teeth and immediate supporting structures but also many muscles, and other structures with a variety of uses add to the complexity, to say nothing of an articulation that is endowed with a greater amount of mobility than any other joint in the human anatomy.

FORCES OF OCCLUSION

At the present time, there are six recognized forces that cause teeth to assume and hold their places in the line of occlusion, and if the denture develops in accord with Nature's plan, we will have a normal occlusion. If, on the other hand, these forces of occlusion are perverted, the result is a malocclusion and the same forces that might have maintained the normal become equally active in maintaining the abnormal.

It is difficult to say which of these factors is most important, as they are rarely singly operative, so we will first mention normal cell metabolism, which has to do with the development of the tooth and supporting parts and the eruption of the tooth in the dental arch. Secondly, as the teeth do not always erupt in the position that they will finally assume in the line of occlusion, we find that equality of muscular pressure plays an important rôle in moving them to their proper positions (the tongue from within and the lips and cheeks from without). The third force, that of the inclined planes, is very important, for the morsal surfaces, when they first come in contact in the act of mastication, may very easily be guided to a right or wrong position because of the wedgelike formations of the cusps and sulci. The reaction of one jaw on the other must not be underestimated. The force of normal approximal contact differs from the foregoing in that it operates on approximating surfaces of teeth only, absence of this factor producing a shortening of the arch. Failure to recognize this condition causes errors in the diagnosis and treatment. This point brings out the fact that the mesiodistal breadth of the deciduous teeth should always be maintained; otherwise, the first permanent molar will assume an abnormal position and each tooth erupting subsequently will be correspondingly out of place. This condition also brings out and explains in a measure the fifth force, which is spoken of as harmony in the size of the arches. Each arch is dependent on

2. Baker, C. R.: The Correct Time for Orthodontic Treatment, J.A.D.A., 12: 759 (July) 1925.

the other for its regularity; therefore, an irregularity in one arch, through action and reaction, will produce a corresponding irregularity in the opposite arch; which emphasizes the impracticability of treating one arch only. This may be further amplified by calling to your attention anomalies in number of the teeth. The sixth and last of the forces of occlusion is normal atmospheric pressure. There is a very definite relationship existing between the sinuses of the head, the muscles of respiration, deglutition and expression and the development of the dental arches, but it is impossible to do more than mention it at this time.

When the growth and development of the dental arches has been perverted and the teeth have not assumed their normal relations, they are spoken of as being in malocclusion.

Those who regard orthodontia as a purely mechanical problem, with etiology secondary to treatment, are doomed to a brief career as orthodontists.

CAUSES OF MALOCCLUSION

Much could be said in enumerating the causative factors of malocclusion. For some years, they were classed simply as being either inherited or acquired. More recently, there has been considerable dispute as to the possibility of inheritance of malocclusion. Some authorities have been very positive that there is such a possibility and others have been equally positive that there is not. Most orthodontists accept the theory that the predisposition is transmitted rather than the actual deformity.

Having thus, for the time being at least, disposed of the problem of heredity as a factor, our attention is directed to systemic or constitutional influences, among which are tuberculosis, rickets, influence of the internal secretions, eruptive fevers, infantile diet and several congenital conditions, such as syphilis, anomalies in number, position, shape and size of teeth, abnormal labial frenum, abnormal tongue, cleft palate, and prenatal cell metabolism.

If we associate the foregoing list with the following local or acquired causes, it will be observed that there is an intimate relationship in numerous instances and that there is a blending in the several groups which makes it almost impossible to separate one from the other. A lack of consideration of this condition without doubt accounts for some of the failures in treatment, and it should always be remembered that, in all probability, there are several factors rather than one only that enter the case.

The second group includes premature loss of deciduous or permanent teeth. prolonged retention of deciduous teeth, nasal and pharyngeal obstructions, delayed eruption of permanent teeth, caries with loss of the mesiodistal diameter or the occlusal relation in either permanent or deciduous teeth, improper restorations, habits, disuse, "sore teeth," presence of scar tissue after extraction, accident and deficiencies in the infant diet.

CONSIDERATIONS PRECEDING TREATMENT

In the foregoing remarks, we have included some of the basic principles that are essential preliminary to treatment. The subjects mentioned are far from being exhausted. The orthodontist has been repeatedly accused (and falsely) of trying to cloud the science with mysticism because they have endeavored to emphasize basic factors rather than the more popular subject of treatment.

At some time before the treatment of a case is actually started, there should be a free discussion with the parent or guardian of the conditions governing the case. The operator should make a careful study, both oral and from casts, as to the extent and character of the changes involved, and he should endeavor to arrive at a conclusion as to whether or not the child is one that will cooperate

and whether or not the child's age and health are favorable.

The length of time to be devoted to the case is an important matter as it has a direct bearing on the success of the case as well as on the financial phase. It should be explained why cases usually require a relatively long period of treatment and how too rapid treatment may effect the nervous system or may cause the death of the pulp; how bone is broken down and built up in this process and how teeth may return to former positions because of too rapid movement. It should be explained how the whole treatment is of physiologic development and not of pathologic conditions. Seldom, if ever, can one give a definite estimate of the time that may be necessary as there is a great variation in the time of eruption and occlusal contact in the teeth of different children. The pain and distress and "after failures" from faulty appliances and too rapid movement, due to the inexperience of the operator, have undoubtedly caused many parents to postpone orthodontic treatment even when definitely indicated.

Unfortunately, the most trying part of the course of treatment occurs in the beginning, as many children experience discomfort at this time. It follows, then, that the operator should use his utmost tact and skill at this time in order to gain the full confidence of the patient. Many children show a decided gain in health, vigor and weight while under treatment, and if it is made a principle of practice not to place an entire apparatus at one sitting, there will be nothing more than a slight discomfort.

There are many other requirements of treatment, a few of which we will but mention and with no effort to list them in the order of their importance: the development of technical skill; carefully compiled and executed records, casts, roentgenograms, photographs, plans for procedure; preparation of the mouth; instructions to patients; consideration of the normal or typal ideal; the type of appliance to be used; length of time for passive treatment or retention; and division of office routine so that definite hours may be devoted to this practice.

ORTHODONTIC APPLIANCES

Orthodontic appliances produce developmental changes through pressure stimuli. The efficiency of the appliance is largely dependent on its ability to bring about these vital changes, and though it may function with mechanical perfection, if it does not function physiologically, its use is unsafe. The force applied should be gentle, constant, uniform, under control and in the direction of normal tooth position. The acme of perfection in appliances has not been attained, nor is any one appliance universal in application.

There are two kinds of appliances that are in general use today. These are usually classified as fixed and removable. The fixed appliances are attached to the teeth in such a manner that their removal is supposedly a matter for the operator; whereas, the removable type may be removed and replaced by the patient at will. The well known labial and lingual arch wires, as developed by Angle and Mershon, are the best examples of the former; while the Jackson apparatus and the more recent apparatus of Hawley are examples of the latter.

Each of the several types of appliances possess certain qualifications that are distinctly advantageous, and, again, each has some decided disadvantages. Most experienced orthodontists prefer the fixed type for active treatment as one very important essential, stability, is exemplified therein to a high degree. Perhaps the greatest disadvantage to their use is the difficulty in maintaining oral cleanliness. This may be controlled in a large measure by having the apparatus constructed as simply and delicately as is consistent with efficiency. Almost directly opposite conditions prevail in the use of the removable appliance. The elements of stability and efficiency are lessened, while

the degree of cleanliness becomes a personal matter with the patient.

The old reliable expansion arch wire is undoubtedly the best appliance for the beginner to use notwithstanding the alluring (and misleading) advertisements of manufacturers to the contrary. The operator has so much at stake that he can ill afford to be misled in the belief that all that is necessary is the sending of a cast and check to the laboratory and that in return he will receive a "miracle machine."

The adjustment of the labial arch wire requires care. The beginner may find it a decided advantage to assemble the parts on a cast, and, later, as the technic is developed, the alterations may be made at the chair, time being conserved thereby. The wire is usually first bent so as to be in reasonably close conformity with the labial and buccal surfaces of the teeth, and as the desired changes are accomplished, it is gradually altered to the desired "ideal" form. The common medium for attaching the teeth to the alinement wire is either a soft metallic ligature or a silk ligature known as an orthodontic traction cable. The use of either of these requires care in placing, so as not to injure the gum tissue, and careful observation with reference to the hygienic conditions. This is particularly true with the traction cable which, while very efficient when properly used, quickly becomes unclean.

In attaching the buccal tubes to the anchor bands, care should be exercised as to their horizontal plane and as to their relation to the sagittal plane. There should be just the right amount of convergence in the direction of the cuspid teeth, and the alinement wire when placed in the tubes should lie as near the gingival third of the anterior teeth as possible, with the fact in mind that force travels in a straight line. For reasons that should be obvious, it is advisable to place the parts in the mouth singly, and when the alinement wires are finally placed, they should enter the buccal tubes easily and be left passive for a few days, with only sufficient ligation to hold them in place until the patient has become accustomed to them. Subsequently ligatures may be placed singly or in pairs as indicated.

The fitting and placing of anchor bands should never be undertaken without first obtaining sufficient room on both sides of the anchor tooth so as to permit the bands being placed or removed readily. This is usually accomplished by passing a piece of ligature wire through the embrasure and twisting it tightly about the contact point, cutting it off to about one-eighth inch in length, tucking the twisted end in the embrasure and allowing it to remain for a day or two, when the desired space will be gained. Anchor bands should always be securely cemented in place because of increased stability and cleanliness and lessened liability of gum injury from mobility.

All this may seem elemental, but the points mentioned are of utmost importance; for if the anchorage is once unbalanced and these teeth become "tipped", there will be a serious interference with the progress of the case. After this appliance is completely placed, the adjustments should be made at intervals of about one week. More frequent adjustments are superfluous except in an emergency.

Next in order we would suggest the lingual arch wire, either plain or with its simpler attachments, for well selected cases. These wires may be divided into two classes, the fixed, which is firmly soldered to the anchor bands, and the removable, which is attached to the anchor bands by means of a locking device. The first is not used as frequently as formerly because the modern locking devices offer so many advantages.

This type of appliance has the advantage of stimulating development through a gentle spring pressure. It leaves the labial surfaces free from "ornamenta-

tion" and permits of better prophylactic measures, and the free action of the external muscular forces, etc. It does not require adjustment oftener than once in several weeks if the attachments have been well chosen and the patient cooperates in care and cleanliness. In the hands of the beginner, the forces are not so well under control as with the labial alinement wire. Because of its length, the finger attachments and the tendency of the tongue to "play" with it, a negative force is apt to develop which may tip the anchor teeth. This factor may be partly overcome by judiciously fastening it in place with ligature wires; if, however, a tipping of the anchor teeth is desired, these conditions become desirable features.

We cannot pass from these types of appliances without a reference to the plain or pinch band, which often is such a valuable adjunct. These bands are usually equipped with some kind of spur or loop attachment, designed chiefly for engaging ligatures, and are of great assistance in rotating teeth. They should be accurately fitted on the natural tooth, with the solder joint preferably on the lingual side, and, when in series, the edges should all be trimmed to a plane and parallel. This reduces the unsightliness of their appearance greatly. They should always be very carefully cemented in place.

I feel that the pin and tube appliance and the later developed ribbon arch with its brackets have no place in the hands of the novice. They are admirable in the hands of the experienced operator and possess many advantages over other types, especially when root movement or bodily movement of teeth and general bone development is indicated.

There seems to be a belief that the removable type of appliance is the apparatus to be used by the practitioner who elects to treat an occasional case of malocclusion; that it is simple in its operation; that the only essentials are to get it made and placed in the mouth and, with a few adjustments, one will arrive at the desired goal. This is a mistaken idea, for if the beginner will select his first cases with care and then use a reasonable amount of good common sense, he will find the alinement arch wire outfit a most satisfactory apparatus.

We venture the remark that Jackson has experienced many discouraging conditions, and were it not for his indefatigable energy and persistence in adhering to an ideal, he would never have arrived at his present attainment. Jackson has been fifty years in developing the apparatus that is usually referred to when we speak of a removable appliance and in passing we wish to express our appreciation for the unselfish manner in which he has given his many ideas to the profession. All credit to him.

The removable appliance has its advantages; it also has its disadvantages. The greatest argument in its favor is the fact that it is removable. This likewise becomes its greatest disadvantage. Even Jackson is now adopting a "semi-fixed" principle. This, coupled with the fact that most of the experienced men are using the fixed apparatus, should cause the orthodontist of the future to adopt the more standardized methods of treatment.

I prefer to limit the use of removable appliances to the "retention" period. A reasonably broad experience has demonstrated that none but the most conscientious patients cooperate to the fullest degree, even in the retentive period, in wearing a removable appliance.

I have found the retaining plate as developed by Hawley to be of great value. It is a skeleton vulcanite plate with a labial wire bow and loops engaging the cuspids and incisors; with small clasps to engage the first bicuspids as an aid to its retention. Its advantages are that it affords support to the teeth and arches; it permits freedom of function; it permits of removal for prophylaxis; it may be gradually discarded to

test the permanency of the new tooth positions; it maintains the arch form; through small attachments upon the bow, minor finishing adjustments may be made; it is invaluable in the control of "overbites"; when a small shelf or inclined plane is added behind the incisor teeth, it may greatly aid in the retention in Class II cases. When consistent cooperation in wearing this appliance is not gained, it would be better to resort to the lingual arch or some other suitable device.

COMPROMISE TREATMENT

The question of extraction in orthodontia is a much debated subject, and when one undertakes the discussion of "compromise treatment," he is treading upon extremely thin ice. It is only for the purpose of driving home one point that we mention the subject at all. The general practitioner, in his misguided desire to render a service and effect a "better looking" set of teeth, all too frequently, extracts perfectly sound teeth and by so doing mutilates a denture in such a manner that it probably can never be restored to its normal efficiency and appearance, to say nothing of the subsequent effect on facial balance and general health. One reason why teeth are crowded or irregular in their alinement is an insufficient development of the supporting structures, and therefore it follows as a fundamental that there should be an increase of supporting structure rather than a further diminution of it. Let it be your axiom that a full complement of permanent teeth is necessary to the welfare of an individual and that the extraction of a permanent tooth for orthodontic purposes cannot be countenanced. This topic has been the subject of much discussion in the sessions of the American Society of Orthodontists, and the consensus of opinion in that body is that quoted above. There are certain exceptions to this rule, but they do not come within the scope of this paper; suffice it to say, normal occlusion, according to the individual type, is the basis of all dentistry, and normal occlusion implies thirty-two teeth.

Because all orthodontists are dentists it does not follow that all dentists are, or may even hope to be, orthodontists. Notwithstanding there is an urgent need and a wonderful opportunity for more men in this special field of endeavor, there is no place for the man who is not ready to make a sacrifice in order properly to qualify for the practice.

Perhaps the most discouraging thing on the horizon of orthodontia is the lack of a really serious consideration of the fundamentals, which is evidenced by a large percentage of the men who seem to be most anxious to take up the work. Scores of men have spent years in the study and treatment of malocclusion, and still they meet with failures. What must be the inevitable result for the empiric practitioner who believes in "systems" or "appliances" only? There is but one answer: failure and discredit.

CONCLUSION

It is well to mention that orthodontia may best be taught as a postgraduate subject. It is a subject far too important to be included (crowded) in the dental school curriculum except in its basic principles and fundamental technical procedures. The dentist's mind is much more receptive and analytical after a few years of general practice.

Let it be remembered that there is no one best method, and, finally, to send a cast to the commercial laboratory for a diagnosis and outline of treatment is indefensible. Diagnosis requires the vitality and visual tests and anything short of this is insufficient for consistent and successful treatment.

ACTINOMYCOSIS OF THE MOUTH AND NECK

REPORT OF A CASE

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History.—B. W. D., a railroad expressman, aged 47, was sent in by a dentist to have a lower left impacted third molar removed, as it seemed that the presence of this tooth might explain some trouble the patient had been having for some time. Questioning of the patient elicited the following history: About a year previously, he began to notice that the neck band of his shirt was apparently getting tighter, following which his throat became terribly swollen on the inside and "sore as a boil." He went to a physician, who painted the throat with iodin, the treatment giving some relief, but for a few hours only. The physician seemed unable to diagnose the case and the patient started using several proprietary liniments and poultices on the outside of his neck; which seemed to relieve him somewhat, but the throat remained swollen and sore. Another physician advised him that he had a cold in his head and he was given some pills, which had no beneficial effect. Several months passed with the condition remaining almost the same, and the patient applying home remedies to his neck. A third physician burned the throat with iodin, which ameliorated the condition for a few hours at a time. Within the last few months he had consulted several physicians, but could find none who could relieve him.

Three weeks before he presented himself at this office, his neck gradually became worse, more swollen and painful, and he often had choking spells, some of which were of sufficient severity as to threaten his life. For several weeks past, he had been able to get very little food past his throat, and the last week and a half had swallowed nothing but a little milk. He had lost a great deal in weight during the past few months. His neck had never become swollen in any one spot—just generally swollen on the inside, and the sensation was always similar to that of a very sore throat. Finally, someone suggested that the condition might be due to his teeth, and he consulted a dentist, who discovered the impacted third molar and referred him to this office, March 1, 1924.

Examination.—The posterior part of the floor of the mouth was slightly raised, more on the left side, and the throat was constricted, but the surface

tissues were normal in appearance. Deep pressure outlined a mass about 7 cm. in diameter, oval in shape and very hard, deep under the root of the tongue and extending somewhat to the right side but mostly to the left. The lymphatic glands of the neck were not palpable. The mass was slightly movable and not connected in any way with the mandible; which, taken with the general appearance, ruled out the possibility of the teeth being an etiologic factor.

The history and examination of the case suggested dermoid cyst, gumma, blocking of the submaxillary salivary gland, tuberculosis or sarcoma. The patient was sent for roentgen-ray examination of the floor of the mouth and a Wasserman test. He returned, March 3, with no apparent change in the condition. Roentgen-ray examination revealed no stones in the ducts of the submaxillary or sublingual glands; the Wasserman reaction was negative, and the temperature was normal.

Course and Treatment.—Among the conditions suggesting themselves, submaxillary gland trouble was still uppermost, and an examination of the mouths of the ducts showed very little saliva issuing from them. With some difficulty, a fine probe was worked into both submaxillary ducts, back to the posterior border of the mylohyoid muscle and down as near the glands as possible. The removal of the probes was followed by a profuse flow of saliva of normal appearance. Full strength tincture of iodin was employed in painting the floor of the mouth over the duct openings to help keep them open, and the patient was instructed to return in two days. He returned, March 5, reporting much improvement, and the same procedure was repeated. He returned, March 8, reporting greater improvement, saying that he could now "swallow all right" and was taking his meals regularly again. He continued to improve under this treatment, and regained his lost weight, but the mass under the base of the tongue seemed to be moving nearer the surface and farther forward, and was getting softer. March 21, he was free from pain and could swallow almost normally, but the mass under the base of the tongue was very near the surface and fluctuation was detected.

A lance inserted in the mass brought no fluid except thin watery blood. When inserted to the depth of 4 cm., it did not drop into a cavity containing fluid as expected, but seemed to come in contact with very soft friable jelly-like tissue. An iodoform gauze drain was inserted to the depth of the incision, being changed every second day over a period of ten days. The mass gradually decreased in size, there was no pus formation and the patient continued to improve. The opening was then allowed to heal.

During the next ten days, the mass became progressively smaller posteriorly, but larger anteriorly, until there was a hard movable boardlike mass extending under the entire anterior portion of the floor of the mouth. After several days, this mass became soft and fluctuating, and an incision was made in the center of it, extending to a depth of 5 cm. Contrary to expectations, no large cavity containing fluid was disclosed, only the very edematous soft jelly-like tissue such as was encountered in the first incision. However, at the greatest depth of the incision, about two drops

of yellowish pus was obtained. An examination of this pus revealed no organisms. An iodoform gauze drain was inserted, being removed after two days. There was no further pus formation, and the swollen mass was rapidly subsiding. Three days later, the swelling was practically all gone. The patient was apparently well and his lost weight had been practically regained. He was told to report in a few days for a final examination.

Three days later, he returned. The outside of the neck was markedly swollen from ear to ear and was hard, brawny and indurated. A wide and deep incision was made in the median line, an iodoform gauze drain was inserted and the neck was kept covered continuously with hot wet packs. No pus was found at the time of the incision. Two days later, large quantities of thick yellow pus began to discharge from the incision, and the swelling near the ears was considerably reduced. Stained smears and cultures of this pus showed many leukocytes but no organisms.

About this time, the patient complained of systemic effects of his condition for the first time and he was given a complete general examination by one of us (A. K. V. D.). The report follows:

General History and Examination.—B. W. D., who stated that he was just "not feeling well generally" on further and direct questioning, complained of frequency and urgency of urination, saying that he was oftentimes so drastically urged that he had to urinate no matter where or under what conditions. This condition, he said, was of about one year's standing. He also complained of obesity, at that time weighing 310 pounds. He had always been overweight, weighing 16½ pounds at birth, 200 pounds at 10 years of age and 325 pounds at the age of 20. His previous medical history was negative with the exception of malaria and smallpox, twenty-five years ago, and an accident in childhood that destroyed the sight of his left eye. There was no history of other adult illnesses or operations or venereal infection. His general history was negative. He denied having a big appetite, and said that he was not thirsty and drank only small quantities of water. Direct questioning revealed that the total amount of water consumed in twenty-four hours was slightly more than one gallon. He said that water drinking was a habit: that he did not drink because he was thirsty but because the opportunity offered itself. His family history was interesting from the standpoint of his obesity. His mother, who died of cancer of the breast, in her active life weighed 210 pounds. His father, who died from violence, weighed 285 pounds. His two brothers weighed 285 and 250 pounds, respectively, and one sister weighed 210 pounds. All were living and well. There was no history of diabetes, chronic interstitial nephritis or tuberculosis in the family.

The patient, who was about 5 feet 8 inches tall and weighed 310 pounds, appeared of about his given age (47). He showed no signs of eruptions, glandular enlargements, jaundice or edema. The skin was not harsh or dry, but slightly puffy. His mental processes were good but slow in reaction. The blood pressure was 180 systolic, 110 diastolic. The temperature was 99.5; respiration 20; pulse

90, of good quality and regular. Examination of the head was negative except for an area of alopecia on the vertex and back. The hearing was normal, to watch test. The right eye was normal, vision being 20/20. The left eye could distinguish only between light and dark. The eyebrows showed some thinning in the outer one-third. The examination of the nose was negative. The teeth were in fair condition. The neck showed a very hard, indurated, reddened area about the size of an orange extending from near the angle of the jaw on one side almost to the angle on the other, and from the mental protuberance above to the inferior border of cricoid cartilage below. The skin was reddened, tense and shiny over this area, and slightly painful to the touch. There was a linear scar about 5 cm. in length in the midline of the neck, with a gauze drain in it. The thyroid was not palpable. There were no other palpable glands. The lung findings were normal. The heart apex and left border were slightly enlarged to the left, and the aortic second sound was accentuated. The extremities showed no edema and no varicosities. The deep and the superficial reflexes were present and normal. Rectal examination showed that the right lobe of the prostate was slightly enlarged and tender. The seminal vesicles were normal. The genitalia were well developed and normal in appearance and size. Blood count showed: 4,500,000 erythrocytes, hemogoblin 75 per cent, leukocytes 13,500, color index 7, polymorphonuclear neutrophils 70 per cent, small mononuclears, 21 per cent, large mononuclears 5 per cent, transitionals 1 per cent, basophils and eosinophils 2 per cent. There was no poikylocytosis, anisocytosis or polychromatophilia, nor were there any nucleated red cells. The Wasserman reaction was negative. Urinalysis showed acid reaction, with specific gravity 1.011. There was no albumin or sugar, and no indican. No acetone bodies, casts, cylindroids, blood, pus or crystals were found. Prostatic smears were negative.

From the physical examination, it was felt that his "not feeling well" and his hypertension were due, by exclusion, to his obesity and probably to slight thyroid deficiency, and that his frequency of urination was due to a low grade prostatic involvement. Nothing could be found that seemed to have any relation to the trouble in the neck.

The general treatment will be given later in this report.

Course and Diagnosis.—During the next ten days, the swelling decreased except in the anterior part of the neck under the chin, and thick yellow pus kept discharging through the incision. Repeated examination of this discharge revealed nothing but leukocytes.

During this time, the tissue had broken down so deeply that the iodoform gauze was packed in practically to the anterior surface of the thyroid cartilage and from there downward about 6 cm. in close proximity to the anterior surface of the trachea. A specimen of tissue was secured, microscopic examination of which revealed nothing except granulation tissue.

From the clinical course of the case, the peculiarity of the discharge, the appearance of the tissues and the eosinophil percentage in the blood count, the possibility of actinomycosis, which had been thought of before,

now strongly suggested itself in spite of the fact that the streptothrix *actinomyces* was not found in the discharge and the pus did not appear microscopically to contain the typical sulphur granules. At this time, the suspicion of actinomycosis was further strengthened by the patient's statement that, in his younger days, he had handled cattle that had "lumpy jaw" and that at the present time in his work as an expressman he had to handle live stock at times. Accordingly, potassium iodid was given in 15 grain doses, three times a day, the dosage being increased later. The sinus was irrigated with a 1 per cent solution of copper sulphate, and three-fourths grain of copper sulphate a day was given internally, as recommended by Bevan in 1905.

Several examinations of the pus were made on different days, and finally the ray fungus was found in a fresh unstained specimen, on May 19.

During the month of May, as many as six of the following described enlargements, each about 3 cm. in diameter, appeared in the tissues surrounding the neck incision. Each followed the same cycle of development, i. e., being hard, flattened and brawny at first, becoming more raised and nodular, gradually softening, with the overlying skin becoming thinner and more reddened, and finally showing marked fluctuation on palpation. An incision in each at this stage was expected to evacuate considerable fluid, but the interior of the nodule contained only extremely soft edematous jelly-like tissue. The nodule in each case was packed lightly with iodoform gauze, the interior breaking down in a few days, with the formation of thick yellow pus and leaving a very persistent sinus.

The picture presented by the similarity of the course of development of these nodules and the reaction after incision became so firmly fixed in our minds that at any future time a case that presented this cycle of development and reaction would be at once very suggestive of actinomycosis.

The internal treatment with potassium iodid and copper sulphate and the local irrigations with the copper sulphate solution were continued during this time, and the condition as a whole continued to get better every day until the original sinus was almost obliterated. June 14, the skin between the various sinuses was removed and the underlying tissues were thoroughly curetted. July 1, the area was entirely healed, with very little noticeable scar formation, and is still well on the date of writing, Oct. 22, 1924.

One of the most interesting features of this case is the suggested possibility, from its course, that the ray fungus might have lain dormant in the tissues from exposure in the patient's younger days, and had not become acute or given rise to clinical symptoms until many years later. This possibility seems to be further substantiated by the fact that when it was made possible for it to become active, probably through lowered general resistance, obesity and mode of living, it remained subacute and atypical of actinomycosis over a period of one year. No mention of this possibility of the ray fungus lying dormant over a period of years without causing clinical symptoms has been encountered in the literature. I believe that if this point has not been established already, it will furnish an interesting field for research and, if solved, would be of

scientific aid to the dental and medical professions.

General Treatment and Outcome.—While not particularly related to the local condition, the general treatment of the patient by use of endocrine therapy and the results obtained are interesting.

The diabetes insipidus, which so often accompanies an actinomycotic involvement, was eliminated from consideration on the strength of the history of lack of thirst, lack of excessive appetite and absence of urinary findings. The total twenty-four hour output averaged 3 liters daily, and this was found to be physiologic, varying directly with the amount of water ingested. The specific gravity, while lower than normal, still showed a fairly concentrated urine (averaging a specific gravity of 1.011), and this low mark was thought to be probably due to large fluid intake.

The patient was placed on a diet calculated to reduce his weight, small doses of thyroid extract were prescribed and the prostate was massaged twice weekly. The frequency and urgency of urination disappeared at the end of the second week of treatment, and prostatic massage was discontinued. The weight, under thyroid therapy, decreased, and with reduction in weight, the hypertension showed a tendency to decrease. At the end of one month, the weight was 290 pounds, a decrease of 20 pounds in the month and the blood pressure, systolic 165, diastolic 105. Thyroid therapy was continued for another two months. At the end of this time, the patient weighed 260 pounds and had a blood pressure of 155 systolic, 100 diastolic. Thyroid therapy was discontinued at that time. The patient has been seen several times since then. The weight and blood pressure have remained exactly the same as when last reported. The neck cleared up under local treatment directed toward the actinomycotic involvement and the general condition and "feeling" were, as he described them, thought to be excellent.

DISCUSSION

Theodor Blum, New York City: There is nothing so instructive as a report that gives one a clear picture of a clinical case; in other words, clinical instruction, from which we learn more than in any other way. Dr. Thomas did the proper thing in calling in a general medical practitioner for a complete medical examination of his patient. Another point of importance is the fact that the chief complaint of the patient is given in the patient's own words. He speaks of the patient saying his neck was as sore as a boil. From another standpoint this report is very instructive, particularly to one who has never treated a case of actinomycosis. I had in my mind a classic picture: a few sinuses around the face, maybe at the mouth and around the neck, discharging pus with yellowish granules, the granules when stained and put under the microscope revealing the ray fungus. If I hadn't found the ray fungus under the microscope, I would have given up the idea of a case being one of actinomycosis. Dr. Thomas states that he applied iodin to keep the mouth of the salivary ducts open. I should like to know how he explains that. One other word about fluctuation: Dr. Thomas stated that he expected to find fluid or pus. There are two conditions in which the sensation of fluctuation to the palpating fingers has been found very deceiving: In primary carcinoma of the antrum, when either the buccal or palatal plates have been broken down, a swollen mass appears either on the buccal or the palatal side and while the mucous membrane is normal over this swelling, the palpating fingers surely are deceived as far as fluctuation is concerned. The second condition is a tumor of the hard palate, the hemangio-endothelioma, a benign tumor which is well circumscribed and does not recur if removed in toto. Here again pal-

pation certainly makes us believe that we are dealing with fluid in the tissues. Another instructive point in this report, and one I think we should take to heart, is the fact that we should not neglect our cases, just looking the patient over, making any sort of an examination and any sort of a diagnosis, and going ahead with the treatment. Every patient should have a complete examination, in other words a complete history with all laboratory tests, and then all these data should be compiled. Only in this way can we learn and leave something for our confréres which may be useful and instructive to them.

Fig. 1.—Dr. Hopkinson's case; before treatment.

Boyd R. Bogle, Nashville, Tenn.: One of the most interesting things in connection with this case and one of the things that was very necessary is the complete history. The demonstration of the ray fungus under the microscope is a necessary adjunct to the diagnosis and until that organism has been demonstrated, the condition is one that is not entirely diagnosed. The general physical examination is a very necessary thing, including a blood count and Wasserman test. Some writers suggest that through the avenue of the mucous membrane or a necrotic area around a tooth or a carious tooth, or sometimes through the avenue of a diseased tonsil, the ray fungus gains admission. Two striking things about this particular case were the facts that the induration formed immediately around each focus of infection and the final treatment given by Dr. Thomas in thoroughly opening, curetting and obliterating these, so to speak, so he avoided breaking down adjacent tissue, which is a significant thing in this treatment. The prognosis in these cases is usually favorable, I believe, as long as we do not get a mixed infection or get metastases. Metastatic infection or involvement is claimed by most authorities, infection of the lung following in many cases, which, of course, makes the prognosis grave. In this case, eternal vigilance was finally rewarded by determining just what the condition was and outlining the treatment. Some believe that a vaccine is indicated and report good results from it. I believe that surgery and the treatment outlined was the proper procedure in this case. Recent writers say that in some instances they have seen an improvement after using deep roentgen-ray therapy,

and in other cases they believed radium had been beneficial. But, in the type of case reported by Dr. Thomas, surgery followed by the local as well as the systemic treatment would seem to be indicated.

Roy S. Hopkinson, Milwaukee, Wis.: This report is particularly interesting to me because I had the good fortune to have a case of actinomycosis come into my hands after a chronic duration of eighteen months with no diagnosis. I have two or three slides (Figs. 1 and 2) that I will show, and I have some questions that I will ask Dr. Thomas before I show the slides. He mentioned the term streptothrix *actinomyces*. In the literature there seems to be a difference of opinion as to whether those terms are synonymous or not. Some authorities seem to think the streptothrix is a first cousin of the actinomyces but does not simulate it from the standpoint of the pathologist. He said something about staining the specimen. I would like to ask him whether in his opinion the actinomyces can be stained or not. I do not believe that the sulphur granules are so apparent or so easy to demonstrate as some of the authors would lead us to believe. I took care of my case for six months, and I never saw them, and I surely had plenty of time if they were present. I believe that many times they are microscopic and not macroscopic. The case referred to was that of a married woman, aged 30, who had been treated for a year and a half for what was diagnosed as phlegmon. This woman had a tooth extracted sometime in February at a clinic, and developed a submaxillary induration. This continued to increase in size, with no tenderness, differing in this from Dr. Thomas' case. Sometime in April, the patient entered the hospital and had this edematous area opened and drained. No demonstration of the organisms was made at that time. In May she left the hospital, returning subsequently with an induration higher and just below the zygomatic process, and an edematous area opposite and above the zygoma. No diagnosis was made. There were about thirty fistulas and discharging sinuses. The patient was very much discouraged over her condition. She had been wearing a bandage over her head for a year and a half, and the physicians consulted had incised these areas without

Fig. 2.—Dr. Hopkinson's case; during and at completion of treatment.

knowing what the lesions were. She was placed in the hospital and hot boric acid compresses were placed over the edematous area opposite the orbit. Subsequently, pus was aspirated and the actinomyces demonstrated under the microscope. She was put on a treatment of potassium iodid, 45 minims at the beginning of the treatment, increased to 223 minims a day in a period of three or four weeks. This case taught me much about actinomycosis. In the literature, two drugs are recommended, potassium iodid and copper sulphate, in combination with the local treatment. I used cataphoresis on these sinuses, and closed all of them but one. This was immediately over the temporomandibular region and had been stubborn for several months. A free iodin dressing was placed immediately over this area, and it finally closed in about two weeks. The false ankylosis of the jaw, which is characteristic in most of these cases, cleared up coincidently with the closing of the fistula. It is not easy to demonstrate actinomycosis. Not too much credit can be given Dr. Thomas for having demonstrated actinomycosis in this patient and getting such a beautiful result.

Boyd S. Gardner, Rochester, Minn.: Dr. Thomas is to be congratulated in his untiring efforts in making the diagnosis of this case. A farmer, aged about 30, came to the Mayo Clinic, and on account of swelling at the angle of the jaw, with trismus, he was referred to the dental section. Roentgen-ray examination revealed a lower second molar that was apparently pulpless and showed some evidence of a pathologic condition at its apex. We were of the opinion that this tooth was the cause of the trouble. However, as the patient was feeling bad, with a slight elevation in temperature and no elimination, he was sent to the hospital. Heat was applied both externally and orally. Dr. New was called in consultation and he advised further use of heat. After twenty-four hours we were able to make use of the lance and from the pus a diagnosis of actinomycosis was made. In this particular case, we had an opportunity to make an early diagnosis and treatment started at once. The tissues were opened wide and iodin was used freely. Potassium iodid was prescribed and radium was used. Convalescence was without incident and with no return of trouble after five years. Had the molar been extracted, the case would have been complicated, with questionable results. This case, like others, emphasizes the necessity of more cooperation with physicians, especially when actinomycosis is suspected.

Arthur E. Smith, Los Angeles, Calif.: The presentation of clinical cases such as this is very instructive. Within the past year, two cases have come under my observation for treatment. In 1826, LeBlanc, of France, suggested that actinomycosis occurred in cattle. In 1841, Dr. Dick, of England, stated that the disease affected human beings. In 1845, Langenbeck described a case of caries of the spine of a patient and noted yellowish granules. Bellinger, in 1876, recognized the parasite and called it actinomyces or ray fungus. Nearly fifty years has elapsed since those men made their discoveries and presented their findings. In 1901, Erving searched the American literature and reported 100 cases. Sanford, in 1923, collected data for 209 cases and 334 unpublished cases. In 1923, New reported 107 cases.

New states that in 68 per cent of cases actinomycosis attacks the cervico-facial region. Sutton, of Kansas City, says that 52 per cent of the primary lesions involve the jaws. Sanford gives 86 as the proper percentage. If an average of these statistics is taken, 64.5 per cent of the primary lesions are located in the jaws or neck. Blair places the responsibility in most cases on the dentist, saying that in nearly every case the dentist is consulted because of abnormality of the jaws, the patient believing that he has an abscessed tooth. The common diseases that simulate actinomycosis are syphilis, tuberculosis, sarcoma, carcinoma, chronic phlegmon, osteomyelitis of the jaw and infected cyst. The isolation of the ray fungus is conclusive evidence of actinomycosis. Dr. Thomas has emphasized the fact that it is very difficult to find the ray fungus under the microscope. New[1] lays great stress on the fact that numerous microscopic examinations of the discharge may be necessary.

Of the cases that came under my observation last year, one, as far as the clinical evidence is concerned, is apparently cured.

1. New, G. B., and Figi, F. A.: Actinomycosis of Head and Neck, Surg., Gynec. & Obst., 37: 617-625 (Nov.) 1923.

The other case is under treatment at the present time. The treatment employed was the opening of the fistulous tracts, thorough curetting, following with 3.5 per cent tincture of iodin, packing with iodoform gauze and large doses of potassium iodid internally, followed by radium therapy.

The definite statistics place considerable responsibility on the oral surgeon, dentist and ear, nose and throat specialist in recognizing this disease soon after its onset and instituting early treatment or referring the patient to a specialist without delay. I agree with Dr. Thomas that the dentist should confer with someone who has had considerable experience or training, for early and radical treatment, which may obviate an embarrassing situation.

W. B. Amy, Toronto, Canada: I have never heard in all the years that I have gone to dental conventions, and I have attended them for a great many years and a great many of them every year all over the country, a more detailed report. If I have any fault as an outsider to find, it would be in the matter of essayists' giving a description of a case but not telling us how it was handled.

Dr. Thomas (closing): Dr. Blum brought out the fact that we should go into a lot of our cases more thoroughly and have a complete physical general examination of the patient to help us in our work. Now that is very desirable and we should do it as far as we possibly can, but, of course, we all know that it is impractical to do so in all of our ordinary routine cases. The ideal is to have a complete physical examination of every patient, and of course the nearer we can get to that ideal the better. I do not have a complete general physical examination in every case. In fact, I thought I was going to be criticized for not having a complete general examination in this case until it got pretty bad. About applying tincture of iodin on the floor of the mouth and letting it burn in to help open the ducts; I don't know what it does or why it does it and I will not attempt to theorize about it, but I know for a fact that in any case in which there is a stoppage of the saliva from irritation around the mouths of the ducts, the latter can be opened very readily in this way. The superficial tissue dies and is cast off in a short time, and the mouths of the ducts open wide. Dr. Bogle's discussion about secondary infection, etc., contained one point that I might take up. It was almost the proudest moment in my life when I received report after report on the secretions showing that I was keeping the case clean and I did not get bacteria of any kind in these openings for several weeks. It is very easy for a secondary infection to enter. Every report that came back from the laboratory said "no signs of any bacteria whatever." About staining the organisms: They will stain with the Gram stain, with what other stains I don't know, but that one is certain to stain them. I should like to emphasize the fact that in most cases of actinomycosis there is usually no rise in temperature for a long time, nor any involvement of lymphatic glands or leukocytosis for a long time, which you would expect to find in an ordinary infection. If swelling is more or less chronic and these signs are absent, one should suspect actinomycosis immediately. Another important thing is the course of these nodules, which was described and which is very typical to me now. If I ever see another case, I am sure I will almost certainly find the actinomyces in any condition that follows a similar course. Another fact to remember is that actinomycosis seldom involves the bony structures, remaining nearly always in the soft tissues as this did, spreading all around the mandible but not invading it.

WHAT IS TRAUMATIC OCCLUSION AND HOW CAN IT BE DIAGNOSED AND CORRECTED?

By PAUL R. STILLMAN, D.D.S., F.A.C.D., F.A.A.P., New York City

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BEFORE defining traumatic occlusion, we must define occlusion, and it is undoubtedly true that, until we obtain the broadest concept of occlusion, we shall be handicapped in our effort to understand traumatic occlusion. Certain it is that until we understand the normal, we shall but grope in the dark in our efforts to restore the abnormal to the normal. No definition of occlusion, either normal or traumatic, can be considered adequate except as it is based upon the thought of function. Ottolengui suggests the following as a definition of occlusion: "The harmonious contact of the teeth of both jaws, whether at rest or during those excursive movements of the mandible which are essential to the function of mastication." He says, further, that by altering the word *harmonious* to read *inharmonious*, we at once have a comprehensive understanding of what is meant by traumatic occlusion. The foregoing definition contains much that should recommend it. It seems possible, however, to carry even more clearly the thought of the stresses that are incident to all occlusal contacts, whether normal or traumatic. It is a fact, although not an obvious one, that stress is exerted upon the teeth and their supporting structures, even when the jaws are closed in the so-called position of rest. The tonus of the muscles produces a constant, although possibly slight, contraction in this position. Our definition should therefore take this stress into account, and may read as follows: Occlusion is the contact relationships of the inclined planes of the teeth of the mandible with those of the maxilla, when subjected to stress during the closure of the jaws, whether stationary or in function. Normal occlusion will, therefore, be found when these contact relationships are harmonious; while inharmonious contact relationships will produce traumatic occlusion. The student of traumatic occlusion must constantly keep in mind the thought that the abnormal relationship may be manifested both where the teeth are brought into stationary contact, and when the contact is a gliding one, as in the function of mastication.

The difficulty that besets the periodontist in attempting to explain traumatic occlusion lies in finding a non-dental illustration that will carry the thought of lack of harmony in gliding contacts. The obvious illustration would be that of a machine whose parts failed to function harmoniously through lack of correct adjustment. We know of no machine that presents

so intricate an arrangement of the interacting parts. The variety of shapes that has been given to the human teeth, and the possibility of their adjustment to constitute an harmoniously interacting mechanism, command our admiration. We can only illustrate lack of occlusal harmony of the teeth by citing some instance so simple as to be far removed from the complexity of the dental mechanism.

I have in mind a globe, which may be made to rest on the rim of a bowl. If the globe is a perfect sphere and the rim of the bowl is a perfect circle, there will be contact at all points in its circumference; there will be an even distribution of any stress that may be imparted through pressure on the globe. If there is any departure from the perfect outlines of either globe or bowl, there will be an uneven distribution of stress, with possibilities of fracture of the bowl. The adjustment of such inequality would call for an operation known to mechanics as "spot-facing." In a machine shop, perfect adaption of two faces, such as just described, is obtained by abrasion, the indication for which is revealed by coating one of the parts with rouge and bringing it in contact with the other. Spots that require abrasion are indicated by the rouge, which is transferred through contact with the high spots of the coated part.

If, in our illustration of the globe and the bowl, we keep in mind the possibility of the revolution of the sphere on its own center while resting on the rim of the bowl, we shall appreciate the need of a perfect contact relationship of the teeth in all the positions that the mandible may assume. Unlike the globe and bowl, the occluding surfaces of the teeth do not form a continuous curved surface, owing to the complexity introduced by cusp formation. Their inclined planes, however, do constitute a continuous, although broken, contact surface. And just as the mechanic endeavors to have every part of his mechanism in contact in all possible positions, so does the periodontist endeavor to have an even apposition of all occluding surfaces, in their gliding contacts, during masticating function.

This requires study of all the occluding surfaces in the mouth, to the end that the inclined planes of the teeth shall be so adjusted that those having corresponding slopes shall harmonize not only with each other, but also with inclination of the condyle path and the curve of Spee. In other words, if we change the slope of the inclined plane on one tooth only, we almost invariably find that other inclined planes in the mouth exhibit a lack of harmony that was not previously perceptible. The correction of the occlusion in that mouth is therefore not complete until all of the inclined planes have been brought into a harmonious relationship.

The same necessity for harmony is recognized by the prosthodontist when he sets up teeth on the articulator. He tries the various movements of which his instrument is capable, and adjusts the teeth until all of the inclined planes have a harmonious gliding contact relationship, knowing that the stability of the finished dentures depends in large part on a freedom from interference of individual teeth during function.

It may now be asked wherein lies the evidence that a departure from normal occlusion, as above defined, constitutes traumatic occlusion. The answer is that, in most cases exhibiting an abnormal occlusion, it is possible to show that at sometime during the patient's life, an injury has been produced; and,

in those cases, it is almost invariably possible to bring about a certain degree of improvement by the harmonizing of the occlusion alone. This fact, while it may not constitute complete proof that the traumatic occlusion was the cause of the disease, is at least the most important link in the chain of evidence.

We have asked the question "How does traumatic occlusion produce periodontal disease?" In the first place, a tooth whose cusps are out of harmony with the other cusps in the mouth will receive abnormally heavy stress during occlusal function. This produces abnormal pressure against the pericementum and the alveolar bone surrounding it. Pressure produces bone absorption, the mechanism of which, in the case of the tooth, lies in the blood vessels of the pericementum and perhaps the gingiva. The result is a tendency to capillary engorgement; a condition that is favorable to the incidence of infection. Derangement of the secretion of the gingival crevice is an added factor favoring infection. Bone absorption permits abnormal tooth movement, which in itself produces irritation and susceptibility to infection. When bacteria have once penetrated into the cemental gingiva, inflammation is set up, which progresses more or less rapidly until the original cause of the disturbance is removed. In other words, we must trace back the chain of phenomena to the primary irritation, which in this case was excessive occlusal stress.

It will doubtless occur to many that certain individuals give evidence of having an excessive occlusal stress upon one or more teeth, yet fail to develop noticeable periodontal disease. This occlusal condition, judged by itself, would be designated traumatic occlusion. The question arises as to why has this condition failed to produce periodontoclasia. The answer lies in the element of resistance to infection, plus a natural abrasion that sooner or later removes the inharmonious surface, and with it the element of trauma. Following this argument to its logical conclusion might bring us to the point where we would endeavor to treat periodontoclasia by raising the resistance to infection, rather than by adjustment of the occlusion. This effort has been made. But with the exception of the toothbrush, no artificial agency has so far been found that is adequate to the task. And, unfortunately, but few individuals possess a sufficiently high natural resistance. We have, therefore, found it necessary to assist the resisting powers of the periodontium by removing artificially the irritation produced by inharmonious occlusion.

We now come to the question "What causes traumatic occlusion?" As Ottolengui says, "It is readily understood that artificial structures which are built too high, will produce excessive occlusal stress. But it is more difficult to understand how teeth may erupt into a condition productive of excessive stress." Nevertheless, it is a fact that such a phenomenon does occur. This takes place much more frequently than would be deemed possible, and thereby seems to controvert older theories regarding the eruption of the teeth. It has always been supposed that as the teeth come into occlusal contact during their eruption, they guide each other by their inclined planes, into normal occlusal relations. It is my observation that this process is frequently incomplete, to say the least. Failure in this respect will therefore produce a mechanical incoordination and lead to occlusal trauma. Even granting an approximately correct

occlusal relation after eruption is completed, we may still find incoordination of the inclined planes, due to slight abnormalities of tooth form. This is not surprising, for it is a well known fact that Nature is constantly producing abnormalities of form in other parts of the body, which interfere more or less with function. Witness the common need of our wearing eye glasses, due to the abnormal conformation of the crystalline lens.

Under such conditions, the teeth may be likened to the parts of a machine, which, as they are assembled, must frequently be fitted and refinished before they will function with each other. This fitting and finishing is performed under normal circumstances by abrasion, which begins soon after the teeth come into occlusal contact. But in order that this shall take place, it is necessary that the alveolar structure have sufficient rigidity to keep the teeth immobile. Insufficient alveolar support, as pointed out by Merritt, because it permits mobility and lessens abrasion will therefore prolong mechanical incoordination. A continuation of this condition produces irritation, and becomes an established traumatic occlusion.

Another cause of traumatic occlusion is periodontal disease. This fact has frequently been noted, and has usually been utilized as an argument controverting the claim that traumatic occlusion produces periodontoclasia. Any inflammatory state in the pericementum of a tooth that is in normal occlusion will usually produce more or less protrusion from the socket, and thereby render the occlusion traumatic. If the inflammation subsides promptly, the tooth may resume its original position and no harm will be done. More commonly, however, the inflammation persists for such length of time as will have caused the traumatic occlusion to set up an irritation, independent of the original one. Instances of this may be found in scorbutic conditions; inflammations extending from adjoining teeth, especially after extractions, and pulpitis that has involved the periapical tissues.

Traumatic occlusion, once established, produces irritation and, through the resulting congestion of the pericementum, perpetuates itself. If inflammation can be produced by, or may itself produce traumatic occlusion, we may consider these things as constituting a vicious circle of cause and effect. In most instances, the beginning of the circle is with traumatic occlusion. But, in either case, it is my unswerving opinion that the resulting periodontal disease can be properly treated only through the relief of the traumatic factor.

DIAGNOSIS OF TRAUMATIC OCCLUSION

What is the first thing that leads us to suspect that a state of occlusal trauma exists? Personally, I examine the mouth and note all departures from a condition of health. To one who is familiar with disease and its causes, the observation of a pathologic condition, which is an effect, at once brings to mind the probable cause of that condition. There may be several possible causes, but all of them will be rapidly reviewed. If it is then decided that an occlusal trauma is one of the causes, the next step to determine is where the mechanical incoordination occurs and how it operates.

Before proceeding to this phase, let us state briefly the periodontal abnormalities that have been clinically determined as being caused by traumatic occlusion. It should be unnecessary to enumerate tooth mobility and pocket

formation, which are the obvious advanced lesions due to traumatic occlusion. And, in fact, these lesions do not constitute the first object of my search. I first look for departures from the normal coloration and contour of the gingivae. This will include evidences of congestion, and certain types of gingival atrophy and hypertrophy. An individual beyond the age of 25 who has had traumatic occlusion for any considerable length of time will invariably exhibit some of these diagnostic signs. In the adolescent, they may not be present, although even at this period gingival atrophy is quite commonly found as the result of occlusal trauma. In the adolescent, then, it is frequently necessary to depend on mobility of the teeth as a diagnostic sign. This mobility is not of the type observed in the older patient. It may be detected by having the patient close the jaws in centric occlusion, and produce lateral stress while the jaws are so closed. Under these circumstances, it will be found, that the entire bicuspid and molar segment will exhibit buccal and lingual movement.

There are many variations in the diagnostic signs of traumatic occlusion, according to other complicating factors that may be present. Experience has shown that it is always wise to look for traumatic occlusion in cases of periodontal disease, since its presence in some degree is so nearly universal.

Having decided that traumatic occlusion is present, our next thought is to detect the spots on the occluding surfaces that are producing the mechanical incoordination or interference. It is not safe to depend entirely on the mark made by carbon paper. The best plan is the study of casts of the patient's mouth, mounted in an anatomic articulator, as brought out by Tom Smith and Bricker. Here, the points of interference, or "high spots," are most readily detected. And here, also, the relative amount of alteration of surface contours that will be required may be most readily determined. Study of the teeth in functional movement should be made in the mouth itself, as well, and any abberrations found on the study casts confirmed. The actual spot on which grinding is to be done, if this method is chosen, will be indicated on the carbon paper, used both in centric occlusion and in functional movements.

CORRECTION OF TRAUMATIC OCCLUSION

Generally speaking, traumatic occlusion that is due to restorations will produce excessive vertical stress, and will therefore call for correction by grinding of the occluding surfaces to make them lower. Traumatic occlusion occurring on natural teeth that carry no restorations, and when no extractions have been performed, usually manifests as an excessive lateral stress. Its relief calls for grinding of inclined planes and does not invariably reduce the actual height of the tooth. These observations are to be taken as generalizations and therefore subject to exceptions. They at least serve as a basis of determining the proper procedure in the individual case.

There has been a certain amount of criticism made public, and possibly much more that has not come to our ears, regarding the destruction of gold inlays, crowns and bridges by these grinding operations. The creators of these restorations, frequently the fruit of the most painstaking and skilful endeavor, take umbrage at what they, perhaps, consider a wanton mutilation of their handicraft. I can sympathize with

these earnest workers but would point out to them that if so radical a correction of traumatic occlusion is needed, the time to do it is before these restorations are made. The bridge worker of today has come to recognize this, and no longer puts "the cart before the horse." He recognizes the fact that not only must the bridge and its antagonizing teeth be in occlusal harmony, but also all of the teeth in the mouth must be in functional harmony with the bridge. The same requirement holds for all restorations, from the single inlay to even a full upper denture occluding with natural lower teeth. The latter instance may sound farfetched, but it is frequently the case that success with an upper denture is impossible without a modification of the occlusal surfaces of the lower natural teeth.

But let us revert for a moment to the gold inlay, which has apparently, or perhaps actually, been mutilated by the periodontist. It often happens that a state of traumatic occlusion has existed in the mouth of a patient having more than average resistance, who, therefore, gives evidence of latent irritation only. In such a case, the operations incidental to the preparation and insertion of an inlay may add sufficient temporary irritation to produce an active inflammatory state. When, therefore, the periodontist is consulted and asked to relieve the painful condition, his only course lies in the correction of the occlusal trauma. That the inlay, built to restore a surface whose contours were previously inharmonious, should suffer from this operation is inevitable. A similar occurrence is sometimes observed in the case of an inlay or other restoration inserted in a mouth in which considerable natural compensating wear has taken place. The dentist, feeling that he should restore function, places a 20 year old restoration in a 50 year old tooth. The incongruity of the black dyed mustache on a grey haired old man is paralleled by the inlay with pointed cusps and deep sulci in the mouth whose occlusal surfaces have become flattened. As stated before, there is in the mouth possessing normal function a gradual wearing down of the cusps, with advancing years. Nature, in this way, by degrees, dissipates lateral occlusal stresses and thereby compensates for any diminution in the physical resistance of the periodontium. When this abrasion does not take place, a condition of occlusal trauma develops, if for no other reason than that the ratio of occlusal stress to resistance has been reversed through the lessening of the latter factor. When the periodontist sees a restoration whose occlusal contours are unsuited to the resistance of the parts as gaged by the age and other indications in the mouth, he has no choice but to bring it into harmony. This is not a pleasant task, but is undertaken with the thought of saving something more valuable than the inlay; i. e., a tooth.

Again, restorations whose contours may have been harmonious at the time of insertion may become inharmonious through failure to wear down as rapidly as the enamel surfaces in the mouth. This may necessitate the grinding of those restorations for the sake of restoring and preserving the health of the periodontal tissues. It has frequently been observed that enamel wears faster even than soft gold, but gold in its turn fails to produce compensating wear of an opposing tooth; and as a result we frequently find two high spots opposing each other, thus intensifying

the injurious effect. Repeated grinding as the years go by is usually necessary.

It is in the correction of traumatic occlusion in the mouth in which no restorations appear that the periodontist frequently finds his most perplexing problem. And, for the inexperienced worker in the field, there may be almost a feeling of dismay because of the difficulty of deciding where to begin and what to do. Let us merely refer him to what has already been said about diagnosis. The study of casts mounted in an articulator will usually give a reliable indication as to what surfaces require reduction. There are, however, certain general observations that may be made regarding the course of procedure. In correcting the occlusion, I usually begin on the anterior teeth. These are shortened and adjusted until the edge to edge bite distributes stress over as many of these teeth as seems feasible. The ideal adjustment usually will also bring into simultaneous occlusion one or more of the posterior teeth during protrusion. This distributes still more the stresses exerted by the muscles of mastication. In addition, it is necessary that a certain amount of lateral movement of the mandible be permitted, without interference of the incisors. The degree required will depend in part on the age of the patient. In other words, the young patient, who is as yet free from deep lesions is capable of carrying on, in a natural manner, a compensating abrasion, which might be impossible for a patient of more advanced years or one suffering from advanced periodontoclasia.

Having proceeded thus far, it will be found that the incisal surfaces present flat facets. This is a deformity, and as such is a hindrance to normal function. This condition is corrected by rounding the edges of these facets, both labially and lingually. In addition, the labial edges of the lower incisors or the lingual edges of the upper incisors are ground still more, if it be found that they are in contact when the jaws are in centric occlusion.

In undertaking the correction of the occlusion of the posterior teeth, it may be said that one who is familiar with coordinating occlusal contours will readily perceive those cusps and surfaces that are out of harmony, even without the use of carbon paper. For the less experienced, it will be necessary to have the patient close the teeth in centric occlusion on carbon paper and institute a buccal excursive movement. In addition, it is well to place the tip of the forefinger lightly on two teeth during this excursive movement. This will reveal the degree of displacement, at the same time that the carbon paper marks the spot that requires reduction. Grinding, so guided, proceeds until no shock is felt by the finger tips during any occlusal contacts. In general, grinding is done chiefly on cusps. Seldom is it necessary to grind in a sulcus. Long pointed cusps almost invariably require shortening, and are rounded as they are shortened. There are no flat surfaces on normal teeth; when found, they are to be considered an acquired deformity. The interference with function produced by deformity anywhere is well known. Consequently, these flat surfaces should also be rounded, by grinding at their periphery.

Having gone over the entire mouth in this manner, it will be found that what has been so far accomplished is but the first step in occlusal adjustment. It is usually wise at this point to dismiss the patient, with the warning that

he must not expect perfect comfort at this stage of the treatment. The patients will usually say their teeth feel "funny;" one patient said that he felt that "his teeth were unlocked." The reason for this is that there is a greater freedom of the excursive movements than they have ever before experienced. They consequently do not know where to put their teeth. The reason for dismissing the patient at such a time is that both the tactile sensibilities of the patient, and the powers of observation of the periodontist have become dulled. At a subsequent appointment, these faculties have recuperated. The periodontist then studies his case as if he saw it for the first time, observing points of incoordination that would previously have escaped his attention. The patient affords him valuable assistance by pointing out places that are causing discomfort and whose location has become, to him, very definite. Having relieved these points, the periodontist reassures himself in particular as to the occlusal harmony of those teeth which have deep pockets or which are loose. A slight traumatic occlusion on these teeth may not cause the patient discomfort or even enter his consciousness. Nevertheless, the healing of these pockets demands complete freedom from occlusal trauma, as well as correct root surgery and stimulation.

The final balancing of the occlusion may require slight adjustments at several subsequent appointments. The patient's consciousness of occlusal interference and the failure of the periodontal tissues to respond to treatment will be the chief guides in this operation. It should also be kept in mind that teeth that have been ground at one time may subsequently change their position and thus acquire a recurrent traumatic occlusion. This is particularly noticeable in the case of teeth having deep lesions, since they have a tendency to elongate as the healing process progresses. It will thus be seen that inspection of the occlusal condition should be made at the beginning of each visit, regardless of all other kinds of treatment.

CONCLUSION

While the correction of traumatic occlusion demands the fullest understanding of function and of form, descriptions of methods to be used cannot tell the complete story. The process of adjustment is a mechanical one, just as is the fitting together of the parts of a machine. The mechanic who adjusts these parts may be given instructions as to what he is to accomplish. But he makes the adjustments through the exercise of his own mechanical faculties. If these are lacking, as they are in many individuals, no amount of instruction, be it ever so detailed, will make him successful. Native intelligence rather than theoretical knowledge is the requisite. The dentist who is successful in the "grinding in" of full artificial dentures will find himself quite at home in the details of the correction of traumatic occlusion. Lacking this ability, he might better apply himself to some other field in dentistry. A dentist might hesitate to undertake a real correction of traumatic occlusion just as a surgeon might hesitate to use a knife in unfamiliar territory. A surgeon must perform his operations with his mind as well as with his hand. Before a correct operation can be performed, the operator must have a clear mental conception of the object of the operation and the effect to be produced. More dental operations fail for this reason

than because of a lack of manipulative skill.

A word of caution is in order, as regards both incomplete correction of traumatic occlusion and overcorrection. Incomplete correction may give some benefit as regards the health of the peridontium, but will surely give the patient considerable uneasiness, if not actual discomfort. It will invariably be found, however, that when the occlusion is perfectly balanced and the element of trauma completely removed, the patient is entirely unconscious of his teeth. On the other hand, excessive grinding, or misplaced grinding may do incalculable damage. It is not safe to pull the trigger of a gun on the assumption that it is not loaded.

It is apparent that the discussion and teaching of traumatic occlusion that has been going on so actively during the past few years has brought the profession to the point where much more grinding will be undertaken in the near future than has been the case up to this time. Many operators will probably overdo the correction of traumatic occlusion, and condemnation of the entire procedure will surely follow. But the underlying principle is so well established that mistakes in technic will fail to retard the wheels of progress.

Comprehension of the principles of occlusion is necessary not only to the periodontist, but also to everyone who has to do with teeth. Occlusion is the foundation stone upon which the science of dentistry is built. It therefore follows that abnormal occlusion, with its possibilities of trauma, may intrude itself into any field of dental practice.

If traumatic occlusion may be the inaugurating factor in the progression of events leading to periodontal disease, surely the early recognition and correction of this factor form an integral part in any comprehensive program of oral prophylaxis. Interference with full occlusal function, in the young patient, should be eliminated even before signs of disease have manifested themselves, unless so slight as to seem capable of correction through natural abrasion. When once this principle is adopted and taught to the profession, the amount of restorative work will begin to be materially decreased and interest in the prevention of oral disease, which is the goal of dentistry, correspondingly increased.

THE PLACE OF RESEARCH IN THE UNIVERSITY DENTAL SCHOOL

By NEWTON G. THOMAS, M.A., D.D.S., Chicago, Illinois

(Read before the American Association of Dental Schools, Chicago, Ill., March 19-21, 1925)

WHEN George Washington journeyed to his inauguration, the means of travel employed was the same as when Alexander the Great returned from the conquest of the world. Washington's slaves garnered the grain from the Virginia fields with implements slightly better than those used by Ruth and Boaz, a thousand years before Christ. The signal service of the continental armies flashed messages from peak to peak as did the aboriginies of the neighboring forests. The revolutionary ships of war traveled faster than the galleys of Rome only because spars and cross-beams were lengthened and the canvasses enlarged. The differences noted between the procedures of that time and this are the result of research.

The man of 70 today arches more experience in his life span than the summed lives of all the patriarchs. "If you ask me how old I is, I'se five," said a little colored miss, "but if you ask me how old I is in the fun I'se had, I'se a hundred." By a similar measurement, the contemporary man of seven decades may say with truth that he has spanned a millennium. The days have been made weeks for him, the weeks months and the months years as the result of research. Modern civilization is the offspring of creative scholarship. This modernity is scarcely 100 years old.

The history, then, of such an agent or spirit or movement must needs be absorbingly interesting. The application of scholarship to the ends indicated by the word research was not sponsored originally by the universities. While these institutions were still devoted to the ancient languages and traditional thinking, individuals of scientific inclinations met in the interest of their subjects and organized themselves variously. In instances, these groups became recognized by governments and so were perpetuated. Thus began the Royal Society before the Restoration, to be adopted by the government in 1662. It is recognized by the British government today as its advisory board on scientific matters, having been asked only recently to make a study of tropical diseases such as malaria and sleeping sickness. What is now the French Academy of Science was projected by Leibnitz in 1700 and was organized as it is today in 1816, a branch of the Institute of France. The United States organized the National Academy of Science during the Civil War to advise the government on matters of a scientific character, and to the academy was added the National Research Council, during the World War, for a similar purpose.

Outside the pale of organized institutes, funds, more flexible in nature, have been tendered for the prosecution of research. Among such are the Medical Research Council and the Beil

Fellowship Fund of Great Britain, The Smithsonian Institution of Washington, The Carnegie Institution of Washington, The American Medical Association and the National Research Council, the Carlsburg Fund of Copenhagen and the John Simon Guggenheim Fund.

Special professorships too have been made possible for the prosecution of the work of creative minds. The German government made it possible for Van't Hofft to concentrate on his work without the distractions of teaching. Similarly, the Fullerton bequest made it possible for Starling, the physiologist, through the Royal Society, to give all his time to his chosen endeavors at the University College, London. In 1910, the University of Pennsylvania obtained endowment for a chair in research medicine.

Imitative institutions have been developed to reproduce special institutes without the centralizing influence of some great genius, as in the case of Pasteur, of Koch. So the Lister Institute reproduced on British soil the Pasteur Institute at Paris. Similarly, the Rockefeller Institute for Medical Research was founded in 1901, and the Serological Institute at Copenhagen, established in 1902, which is placed at the service of the whole of Denmark. Special subjects have been given similar attention as well as special fields. Institutes of this kind are found in numbers of the major cities of the occidental world.

It is to be seen that these institutions recruited their workers from the schools at a time when the schools were interested primarily and entirely in the lore of past ages. They were easily drawn away. Pasteur, Roentgen, Loeffler were teachers. As might be expected, when the universities awoke to their responsibility, individuals of outstanding ability with a desire for the contacts and particular opportunities of the school were returned by the Institutes, Academies and Foundations to the Universities. Pasteur Institute has supplied scores of teachers to France, Germany and Great Britain. Lister Institute has supplied Great Britain and the rest of the empire similarly. Rockefeller Institute is represented on the faculties of the major universities of the United States.

What is research? Any definition that I may attempt would be trite, and tawdry in this presence—and fractional at best. Simply stated, it is defined as organized quest for truth, the establishment of facts and their correlation; analysis and synthesis of phenomena for scholastic or utilitarian purposes. And thus on and on. It is man's search for the combination to the storehouse of knowledge. To make a difficult task easy by illustration: it is the method by which Ramsey and Raleigh discovered five more constituents in the air than were dreamed of and the means by which helium has been made to float airships, and by which argon was put to service in electric bulbs. It gave answer to Crookes when, in 1898, he said, "England and all civilized nations stand in deadly peril of not having enough to eat because of nitrogen deficiency in the soil," by discovering a means of saving the soil from sterilization and the human race from unbreakable famine. It gave aid to the engineer and made the Panama Canal possible, a feat De Lesseps declared would cost a life to every yard of dirt. It is the means by which the scourges of mankind have been driven into their caves and their exits sealed forever. It

is the means that presages the time when health will be foreordained for the mouths of children and maintained through the lives of men because caries and pyorrhea and malocclusion, with their train, will be subject to the dispensation of scholarship.

What shall be its place in the consideration of this body? Let me ask what relation the dental school would hold to the university. If it would be a part of the university, it must consent to the university consideration of research. Or again, what is the reason for the existence of the dental school? Your answer is, "Disease." The obligation, then, of the dental school is to study disease, understand disease, control disease, prevent disease. For years, Germany has been saying that teaching and research are the twin functions of the university. England and America were later in consenting to the relationship, but today no university questions the inalienable sisterhood of the pair. To deny this relationship to creative scholarship in any academic organization brands the institution with illegitimacy. It would be exceedingly difficult to maintain confidence in our claims that we are scientific should our schools send out men who can make a rich livelihood out of disease only, but make no attempt to prevent it. The place of research then must be accepted, esteemed, prepared as is the place of teaching and not regarded as an accident. The relationship of these functions must be seen as vital—the interaction of the two being essential to the success of each. No teaching enthusiasm alone can suffice to save didactics from a fatal stagnation. No preachments can give a student the needed understanding of the far-flung outposts of any science as does the nearness to a research laboratory. Stasis, rule of thumb, the tyranny of sentiment, a sense of fixed boundaries to dental science has taken a heavy toll from dental advance. As a teaching value, research within a school is the greatest, the best known stimulant. What man does not thrill to the announcement of a new discovery?

The requirements for such a program are obvious: scholarship, natural endowment and opportunity.

Illiteracy cannot find its way in the mazes of natural science. The finest scholarship of our schools is required to follow the blaze marks that Nature has made for the guidance of the investigator. The astounding thing is not that the worker loses his way but that he does not lose it more often. It is an inspiring optimism that believes the human mind greater than any problem that confronts it. Because men believe this, they knock at any door, try any lock, dare any barricade, undertake any prodigy of labor, see no necessary goal as unattainable. Addressing the American Physical Society in 1899, Rowland outlined the problems confronting his confréres by asking, "What is matter? What is gravitation? What are ether and radiation? What are electricity and magnetism? How are these connected and what is their relation to heat?" At that moment, he believed, with a faith that reached sublimity, that his questions would be answered. Scholarship is a prerequisite to research.

What is the scholastic record of dentistry? What are the scholarship requirements of dentistry? Is the first at all inspiring? Is the second at all promising? Not long ago, an observer (Linn), not a dentist, addressing a dental faculty, said, not critically but observingly only, "Dentistry has had no

great scholars. It has given the world no great names: aside from their contribution to dentistry dentists have given nothing else." The accusation carried with it the corollary that, to date, dental greatness has been only dental. It has lacked catholicity. The educational background was too limited, hence the horizon was of reduced diameter—no Osler, no Senn, no Holmes, no Mitchell, no publicist, no philanthropist has been born to her. Writing of the requirements of research, Metcalf of Oberlin says:

> Catholicity of interest is necessary to sound productive scholarship and such an interest obviously can not be founded on a high school preparation, nor on a lone year of college, nor on two years of college that are definitely and directively professionward. Education is primarily to fit a student for the world he inhabits—first for citizenship and not as a future doctor, artist or engineer. In past times we have taken the raw material of life and attempted to make professional men out of it.

"Youths have a right to the cultured heritage of humanity," says Flexner. "This is best for them as persons and in the long run as bread winners, as well as the application of scholarship." Great vision must have a high place for its feet. Thus in the thought of many are associated scholarship and munificence of mind—of capacity for service.

To answer to some degree the second question, let us scan the circulars and catalogs of our schools. One is impressed by the linkages made between dental and medical schools. The reasons for this obviously are economy, relationship values between the two professions, and the actual teaching value in basic subjects, because medicine makes certain requirements of its teachers, and dentistry has established none, unless you admit the degree of Doctor of Dental Surgery, which offers a questionable assurance. It is the sciences that are taught by these specially prepared teachers. As happy a circumstance as this may be, what does it signify for the readiness of dentistry to undertake problems of its peculiar interest when it depends for scholarship on the propinquity of a medical school? How independable this is is easily seen when one realizes how little interest to date has been taken by these men in dental issues. Slowly, without doubt, they will come to the subjects of oral concern, but what of the meantime? We are essentially dependent on outside scholarship to teach the fundamental sciences to our students. The scholarship we utilize is not dental scholarship. Only in rare instances are sciences taught by men having a doctor of dental surgery degree and more rarely still is this work accredited by the universities.

The circulars speak significantly on this question. A survey of the faculty lists of the dental colleges of the United States was made by Dr. I. Schour to estimate as well as possible the scholastic level of their constituency. Only the degree of Doctor of Dental Surgery in connection with academic degrees was considered. The doctor of medicine degree was not included. Considered by itself, the doctor of medicine degree signifies no special preparation for research. Also only the actual dental faculty was included. One doctor of philosophy graces this union in the United States and, parenthetically, one in Canada. Twenty-two masters are found with the degree of Doctor of Dental Surgery, twelve of whom are found in the departments denominated practical. When, however, the number of men employed in these departments is taken

into account, the percentage is pathetically low. In eighteen schools, there were only two degrees combined with that of Doctor of Dental Surgery of both the baccalaureate and master rank. Six schools have not a single baccalaureate on the whole staff of specifically dental teachers. With the crop of bachelors that may be expected by the granting of the degree following the second year or as an equivalent of the total five years as is done by some schools, a change will appear in the catalogued reports, but the investigative results are dubious. No one will ever accredit such a degree with more than half the educational value of a similar degree obtained in a college of arts and sciences of first rank.

Another phase of the same subject is the esteem given titular rank manifested by the readiness with which assistant professorships, associate professorships and professorships are attained by faculty appointees. One wonders if the professorship is not a sort of inducement offered by the schools for the acceptance of the positions. Not five years ago, a professor in a prominent dental school declared that, with no preparation for any department of science, he was to take such a position. That he spoke truthfully was shown by a review of his history; and the number of departments in which he had served after his appointment tabulates the esteem of the school that gave it to him. He had practiced for years but had no specialty and no previous college preparation. He passed from department to department carrying his title trippingly from subject to subject. One man may teach widely disparate subjects under two titles on the same faculty. An instance comes to notice of an appointee receiving a professorship in a fundamental science one year after graduation in which he had received only the cursory and superficial training of the dental course characteristic of ten years ago. One year ago, a midwestern college gave a professorship to a man of high school antecedents only plus a technicianship in a histology laboratory—a professorship in histology and pathology. Also, graduate degrees are being offered in schools whose teachers have themselves never done any graduate work. In instances, this can certainly be done, but equally certain it is that it becomes a mockery in general practice. What chance has a plant like research to grow in such an atmosphere? Certainly its growth can be only sporadic.

In an attempt to obtain the attitude of the schools toward research, I sent a simple questionnaire to a number of deans to aid me in this analysis. The University of Illinois asks for a report by semesters of the teaching, research and administrative activities on the staff, so I sought a fairly concrete statement, if obtainable, on the subject from other schools. No one was able to give definite data on this question. One dean named three men doing investigative work, and another three subjects in which work is being done. Question two was: Is any department exempt from the expectation of research? The answer was uniformly negative, although no one stated that some departments were uniformly inactive and negative. Question three: Do you observe much inclination toward research on the part of men having only the dental degree? One said, "There is generally no inclination toward research on the part of men who have had only dental training but there are a few exceptions." Another, "Quanti-

tatively, no; qualitatively, yes." Another said "Yes." Another, "The average clinical dentist is not interested, I find, in research. It is by the teacher in the scientific subjects pertaining to dentistry that we get our chief research work done." Question four: Do you regard the dental schools of the country as approaching at all nearly what might be expected of them in research? One man said the expectation should be modified because of such interruptions as the war and the interferences of curricular and requirement changes. He was hopeful, however, of the future. Others said "No" unqualifiedly, while again "No" was the reply, with lack of money as a reason for exemption. The last question was: What percentage of our journalistic content do you regard as deserving the name of research? Some overlooked this in their replies. One said, "I should say a small percentage." Another, "A very low percentage." Another, "One per cent would be an excessive estimate." In keeping with the tone of the foregoing, I was asked to suggest workers for recommendation to the John Simon Guggenheim Memorial Fund. I asked for time to reflect. The questioner who knows dentistry with a first name intimacy said, "I fear we have none who will pass the test."

Seventy years ago, de Toqueville said of America, "The man of the north does not care for science as a pleasure and only embraces it with avidity when it leads to useful applications." Today, that would be a libel; then it was a pellet hard to swallow. Its curative value was tremendous, for many believed that it saved America from national calamity. The Hunterian episode of ten years ago had the bitterness of aloes to the tongue, but dentistry may well feel indebted to it as a timely stimulus. So with our educational review at this time: The virtue of a medicine is not in its taste but in its effect.

Within the limits of opportunity, much will have to be implied. Hours of actual teaching often totally exclude any possibility for reading or reflection, not to mention the utter weariness that would make investigation impossible. This is particularly true of the practical departments. Many of our schools are undermanned, and, as a result, the teacher's work is on the same hour basis as street labor, to which must be added the greater intensity of the toil. In some schools that take high rank in public mention, teachers spend five full days out of six in actual man to man effort to guide students' minds and hands. It is preposterous to expect curiosity to thrive in a mind fogged by the end-products of fatigue.

Next, money must be available for the prosecution of research. There is a close relation between this and the undermining mentioned above. This, of course, is entirely from the university point of view. General endowments are available for the prosecution of the work if such men were at hand. Our problem is intramural; the man must be developed before he can be endowed. In one of its major departments, the University of Illinois has fourteen persons who devote all their time to research. This indicates a possibility. We will not blame the university if, to date, we have none such or only widely scattered cases of this kind. Perhaps we have not impressed the universities with our results sufficiently to justify such an expenditure. I know that in some instances university presidents have rebelled against recommending men with no special training

as they estimate training and no promise of production for such salaries as our schools ask. The output in actual investigation in too many instances is too nearly nothing to support the presidential appeal were the president moved to make it.

Closely akin to the suggestion of opportunity is encouragement to research. Here, again, I fear we are particularly weak. I know the universities stress it and urge it, sometimes, it seems, *ad absurdam*. The requirement has sometimes the awesomeness of a commandment and has much the effect of a commandment in producing evasion. The form this evasion takes is dilution, to the end that some of the products are vapid and next to valueless, or sometimes the juggling of percentages for the presidential eye or the applying of the name to mere compilation—deceiving to the uninformed but inherently a falsehood. We cannot expect much accomplishment unless it is preceded by accomplishment. No amount of apostrophe to creative scholarship will give rise to an ambition to attain it among instructors or student body. A dean or department director may be eloquent, but his address is mere exhaust unless he himself is productive. When the laboratory becomes a seething center of interest in the hidden things that still baffle and detain, an island of revelation in the midst of class routine and the clatter of administration, a place of impulsion that advances the health or scholarship or wealth of the world, student imitation may be expected, but not until then. A professor of chemistry who has done amazing things in his laboratory on coal said, "Four out of five of my graduate students chose for their theses problems in coal." Contrast this with and compare the results of a college that expects research but has department directors that never do any.

Perhaps, too, encouragement might take a more effective form if department directors or heads who hold positions much *in absentia* would not seek to absorb what work may be done by their staffs. Certainly I know such men may advise, direct or cooperate and have some claim in fact to the production of such contributions, but I am speaking of the grosser arrogance that attaches labor of others by no claim whatever save that of position. Said a respected faculty member of long service to a younger man, "Guard your work closely until it is in print or you may lose it." The younger man did not quite understand what was signified but lived to learn the import of the warning. The field of natural science is big enough to afford opportunity for all to share a part, but that same field should not support such a parasitism. The proper spirit of investigative scholarship is belied by such dishonesty.

Other obstacles in the path of research may be named. The weight of the curriculum may be a factor. Students have little time in most schools to consort with the producers in any field. Their daily programs leave them jaded and uninspired. What crumbs of inspiration a given class or subject has afforded are lost to the taste by night. Likewise, the fixedness of the curriculum may tend to discourage them. A few electives might relieve this situation to some degree. A limited number of credit hours in research recommends itself. Such expedients as a research club having some credit values might be tremendously worth while. Such a club has been developed in the Harvard Dental School, the product of Dr. Miner's enthusiasm for creative effort

among his students. A similar organization is existent at Tuft's, fostered by Dr. Rice. I know of no other schools making similar attempts.

Perhaps the subject of organization for research might be mentioned. An extensive inquiry has shown that research does not lend itself to organization. In Germany, research often circles and centers about some brilliant worker, but as a general method this is not to be coveted. Spontaneity of development and individuality in prosecution is commoner in English and American laboratories. In certain fields, as in engineering, problems often call for community investigation because of the materials and means that are involved, but organization always hides the danger of suppressing initiative, the most prized element in the domain of investigation. Similarly, no organization dares to apply censorship of output to any degree. Again, there are certain fields (engineering) where this is done, and, to my knowledge, without great complaint, but a danger nonetheless is couched in the method. What means is employed for the maintenance of research interest by schools or departments—to keep the workers at work? This question has point when the voluntary status of the function is considered, as it has when we observe how easy it is for pedagogs to loaf or laze their time away. In a breath, the answer comes, "None." A little remote from the present, but none the less capacious, is a means effective and operative. Our state universities, and, I think, most universities, expect a teacher to express himself and impress himself in three ways: He must teach, he must investigate, he must serve general university interests. The first and second, I suspect, impinge on the third, even to its exclusion, but I doubt that poor teaching or lack of research would be sacrificed to any degree without rebuke. To speak openly, a man's position would be jeopardized by his inactivity or indifference in either of these fields. What of the man who is a teacher but has not the instinct for research? He is frequently purposed but is mostly imaginative. Such a man keenly interested in his subject but devoid of curiosity, impervious to the why and how of phenomena and negative to all desire to explore or find an answer to the questions that develop in his own mind, is largely figmental. Should teaching in itself absorb him, it seems obvious that any department would give ample play to his genius as a teacher in organization and improvement of method. Such is the state of many departments that such a man would be prized.

The place of dental research is established too firmly for our repudiation. Accepting the university or being accepted by it implies its position in the practice of the college. For it, we must develop scholarship that is able to see and competent to solve the problems presented in the various fields. Then we may expect research appointments and endowments. Atmosphere, the atmosphere made by doing, must be developed, and the opportunity made for student endeavor by curricular change and reward in credits for successful production. Organization is not an essential but may be a hinderance or a discouragement. The problem is solved on a basis of intelligent appreciation of scholarship, the best obtainable, and the opportunity for its application and expression without interference or discouragement.

SOME OF THE FUNDAMENTALS IN THE CONSTRUCTION AND APPLICATION OF CROWN AND BRIDGE RESTORATIONS

By EDWARD T. TINKER, D.D.S., Minneapolis, Minnesota

(Read before the Massachusetts State Dental Society, Boston, Mass., May 4-6, 1925)

IN PRESENTING some of the fundamentals in the construction and application of crown and bridge restorations, I shall endeavor to get away largely from methods and means of technical construction, and deal more exclusively with the whys and wherefores of our procedure. It is with a great deal of pleasure that we note the intense interest and research activity displayed by some of the members of our profession, generally, over the country. One particularly good omen is the fact that fads and fancies are rapidly being relegated to the background, and we seem to be getting together, thinking and acting on a more common plane than we have since that period, which we may term the old days, when the accepted type of a fixed bridge was practically the same everywhere; namely, the Richmond or gold shell crowns, used as abutments, in conjunction with the usual type of pontic, the removable bridge at that time being practically unknown.

Generally speaking, our past restorations merely filled in the spaces, and I do not believe I will be disputed when I say that a large percentage of the wearers of such restorations would have been better off without than with them. However, the men of our profession cannot be censured for such shortcomings, when we stop to consider that our study and comparatively meager understanding of the fundamentals is of recent date.

As you are all familiar with what has taken place, I need not review the interim between that day and the present, except to voice the comment that dentistry, and especially this certain field, has passed through a state of continuous evolution, dealing almost entirely, until recent date, first, with the types of attachments to be used as abutments, and, second, with the types of replacements for lost teeth, their method of construction and the question as to whether they should be fixed or removable.

The first, namely, types of attachments, I believe to be quite definitely agreed on. There still remains a wide disagreement on the second; that is, as to whether we shall use the fixed or the removable.

This diversity of opinion should not give cause for any worry, except as it

affects the individual who allows his enthusiasm to submerge his better judgment.

Of recent years, we have been approaching this subject from entirely different angles, looking for the fundamental reasons for failures, and their corrections. The subject of fundamentals is exceedingly comprehensive, and one of which I am convinced more and more every day that we know comparatively little, or that we do not possess the skill to apply our knowledge.

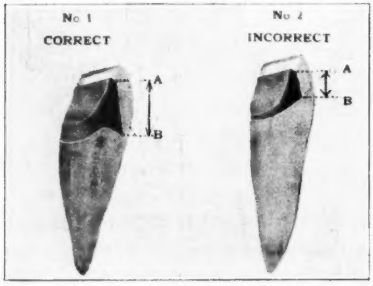

Fig. 1.—Correct and incorrect preparation for the three-quarter crown.

To be successful to the extent which that word is going to mean in the future makes it necessary that we study our case from every angle, and finally arrive at a definite diagnosis.

Necessary to such diagnosis is a thorough roentgenographic survey, not only of the teeth themselves, but also of all edentulous spaces, as frequently we find edentulous spaces containing broken roots, necrotic areas and impacted teeth. This survey will reveal also hidden decay, foci of infection, the extent of bone destruction and relative depths of pockets, as in pyorrhea, and length and comparative strength of the roots involved, together with the thickness of the investing bone, as well as the condition of the periodontal membrane.

When the foregoing disclosures have been acted on, and the case placed in an acceptably healthy condition, we are ready to take up for consideration its restoration.

Such consideration involves, in all cases in which there are any complications, the making of good study models

Fig. 2.—Type of fixed bridgework indicated in upper posterior regions, showing porcelain tipped pontics and interproximal spacing.

and the mounting of these models on an anatomic articulator. A study model unmounted is practically useless.

It is from this point on that we decide on the procedure to be followed.

We are fortunate to have in our profession numerous men of scientific mind who are doing comprehensive work along the lines of occlusion. But up to the present time, their minds and their work are still going through the research period, each individual giving preference to certain instruments and following certain leaders. It is a deep

study, and until their positions and methods of procedure are more unified and generally adopted, the great ma-

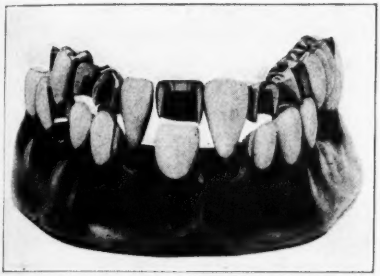

Fig. 3.—Type of fixed work for anterior upper case, showing three-quarter crown construction.

jority of the profession must use the best of articulators at their disposal, making their final adjustments in the mouth.

The decision as to what should be

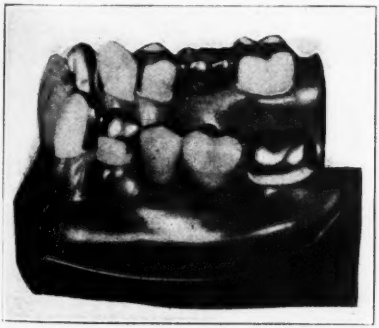

Fig. 4.—Type of fixed bridgework for lower posterior restorations, showing both the inlay broken stress bridge and the full crown type with porcelain pontics.

placed as a restoration, whether it be fixed or removable is, in a great many cases, a matter of personal equation, or I might say personal opinion, for I believe that in such cases as are illustrated by Figures 2, 3, 4 and 5, the posterior bridges can be successfully supplied by either the fixed or the removable type. Personally, if the teeth are of sufficient length and not too badly decayed, so that in the finished preparations the parallel axial walls are great enough, from the occlusal to the gingival seat, to give the attachments a

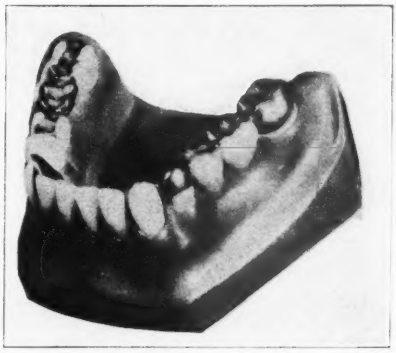

Fig. 5.—Anterior lower fixed restorations.

sufficient grip on the tooth, so as to withstand the stress under which the bridge must labor, and if such teeth are of sufficient firmness in their sockets, I should insert a fixed bridge. On the other hand, if the tooth crowns are so short or badly broken by caries that enough retention cannot be obtained, I should place a removable piece.

The subject of retention is all important. The construction engineer, when drawing his plans and specifications for any given project, is able to figure the strength necessary for his foundations to carry the superstructure, and to build them accordingly, but we,

as dentists, must take conditions as they exist, and by proper preparation of our abutments get out of them the maximum resistance to force. As an illustration of this point, I have taken two central incisors (Fig. 1), extracted from the same patient and practically duplicate in measurements. They are prepared for three-quarter crowns, No. 1 showing a correct preparation, and No. 2, an incorrect, but very common, preparation. The correct preparation gives us a groove from A to B 5.5 mm. in length, 2 mm. more than the incorrect one affords. The correct preparation measures 12.5 mm. of the circumference of the tooth from B, around the lingual, to B on the opposite side of the tooth, 2.5 mm. more than the incorrect one affords. The same careful study and applied technic must hold in all preparations.

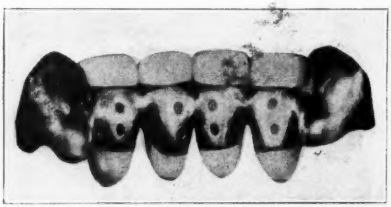

Fig. 6.—Lingual view of lower anterior restoration illustrating pontics with porcelain baked on both incisal and gingival, creating boxlike spaces for the gold portion of the pontic.

Interproximal spaces constitute another fundamental that has a great bearing on fixed bridge application. The tooth crowns of both the abutments and the pontics must be of sufficient length to allow soldering joints of sufficient strength, occupying the occlusal third, the middle and gingival thirds of such spaces being retained as free and open as they can consistently be, to insure stimulation and health of the underlying tissues.

My reasons for the preferences just given are that properly made fixed bridges of a small number of units are thoroughly proved. They can be made comparatively sanitary, and after their insertion, their cleanliness rests largely with the patient. This matter of individual cleanliness applies to the removable type as well. They can be placed with less of an outlay of time by the dentist, and consequently less of an outlay of money by the patient, a fact we must reckon with in the great majority of cases, whether we wish to do so or not.

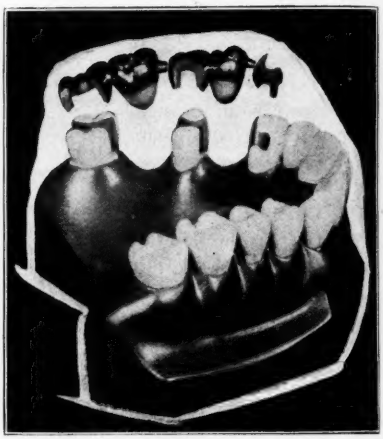

Fig. 7.—Broken stress bridge for posterior locations where one or alternating teeth are missing, illustrating the interproximal lug.

In anterior cases, such as are shown in Figures 2, 3, 5 and 6, I believe the fixed bridge to be the universal restoration.

Figure 6 illustrates the lingual aspect of a lower anterior bridge, showing the

porcelain baked on both the incisal and the root end of the facing, making a box for the gold backing through which the pins pass; an esthetic as well as a stable replacement.

The question of devitalization has played a large part in such procedure. When it was permissible to remove the pulp so that we could use the canal for mechanical contrivances, we could, by the use of the hollow tube and splint pin, construct removable bridges that

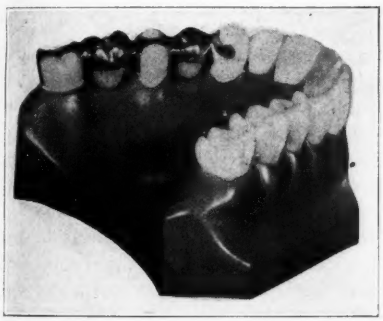

Fig. 8.—Broken stress restoration in position.

were in a measure successful. They were in reality, however, fixed structures, to all intents and purposes, when under the force of mastication. Their only advantage lay in the fact that they could be removed for cleansing and repair in case of breakage. I have yet to see any attachment of sufficient strength, and yet not too bulky, that I believe can be generally adopted in the average anterior case, as long as the vital tooth remains the paramount issue; consequently, my adherence to a fixed bridge for this type of case.

Figures 7 and 8 represent a type of case commonly encountered, and the illustration gives a clear conception of our method of handling them, utilizing broken stress by means of the contact-point lug and socket, in almost all posterior cases in which one or alternating teeth are missing. This means that we certainly recognize the expediency of not fastening teeth together, but by breaking stress we allow them their individual freedom of movement. On the other hand, we also recognize the

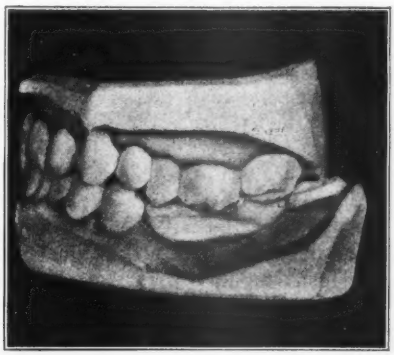

Fig. 9.—Upper case when fixed restoration cannot be considered, and occlusion must be corrected before removable case can be placed.

fact that tooth movement is very slight, and the procedure of carrying more than one replacement, soldered to one abutment, with a free lug attachment on the other end, has proved a failure when such cases are under the average occlusion, too great a tooth movement resulting in the loosening of the abutment teeth.

We have, on the other hand, a large number of cases in our offices in which bridges of the fixed type cannot be given a thought. Figure 9 illustrates such a type. All that is necessary here is to call attention to the length of the

span and the shortness of the tooth crowns, and you can see that, for these reasons alone, a fixed bridge would be folly. In their restoration, the bite would have to be opened and some type of the attachment case or a simple clasp denture applied.

Added to the conditions outlined, we have the host of cases of unfortunates who have lost all the teeth posteriorly to the cuspids or bicuspids. For them, I know of nothing better than the clasp case, and I might say here that this same clasp attachment is, I believe, destined to play a prominent part in our future efforts and that we should give it the time and study necessary to place it in as high a state of efficiency as possible.

The successful dental practitioner must be a man of many qualities. He must have judgment; he must be mechanical, and he must be something of a sculptor, for the reason that esthetics enters into his work in such a marked degree. The artistic side of his nature must be developed to a point where, instead of mutilating features, as we too often see, he must be able to take these same mutilated cases and making use of his knowledge of facial harmony, restore them to as nearly what Nature intended as possible. No greater compliment can be paid a painstaking dentist than to have his patient say, "Doctor, my friends cannot detect the teeth you placed for me from my own."

Some one has said that the greatest art is the art which conceals art, and it most certainly is well applied in dental esthetics.

This prerequisite is only attained by a great deal of hard work and close attention to detail. We must know tooth form and type, and, what is fully as important, be able to apply correctly the form and type to the individual as required. In other words, our minds should conceive a mental picture of the finished case before the operative procedure is started.

And may I say, in this connection, that the attainment of such results is the sustaining element in our professional lives? Joy in the knowledge that you have accomplished something worth while, coupled with the gratitude of the patient, is the tonic that counteracts the routine life of our daily practice. The young man who enjoys his work and has an ambition to become one of the really competent is, for the first few years, going to forget the dollar sign, turn a deaf ear to the so-called efficiency experts in the business side of dentistry, and do as the young surgeon does—perform many a dental operation as the surgeon does his work, for a fee far from commensurate for what he delivers, receiving experience and acquired skill as payment, also developing that prerequisite known as good judgment. Then when his day arrives, he is ready to deliver and assume his position of worth in the community which he serves.

TRAUMA

What a widespread effect that one word trauma has on dentistry. Every cut, every blow, produces trauma to a certain extent, so we must study the mechanical side thoroughly, and this brings us to what I believe we must agree to be the all important fundamental, occlusion, or what is better, balanced occlusion. No matter how beautifully your work may be carried to completion, it will be a failure in direct ratio to your measure of success in attaining this one fundamental. I do not believe there is a man of us in

the room who is not having his difficulty with this one phase of his work. Too little attention has been paid to it in the past, and it remained for many searching minds to force on dentistry the necessity for a keen insight into it.

The attainment of this ideal often begins at the time when we are preparing our case, in the extraction of such teeth as we decide must be sacrificed.

Fig. 10.—Case demanding opening of the bite and the creating of a balanced occlusion.

In other words, when extractions of intervening teeth are made, temporary replacements should be supplied, to retain the remaining teeth in their normal positions. It is a clinical fact that, in the space of time necessary to the proper healing of fresh sockets, without retention the neighboring teeth will shift to abnormal positions, the result being that we ourselves create a malocclusion, which we must later attempt to rectify.

In the case here illustrated an ordinary articulator was employed, for the reason that, until lately, that is the only kind I have used, and I know that the majority of you are using the same. In this case, taken from my practice, Figure 10 illustrates the case as I received it, both sides of the mouth being in the same condition. I have not taken an extreme condition, but one that we meet almost daily, in which teeth have been extracted at different periods, and replacements made with no regard to proper function.

The upper first molars were very much elongated, the curve of Spee being entirely disarranged becaused the bridges were placed on the lower jaw with no regard to tooth form or line of occlusion. The anterior teeth were consequently worn and the lower jaw receded, developing an excessive overbite.

The diagnosis on this case was plain. The upper second molars were well arranged with reference to the anterior teeth. The upper first molars had to be shortened to conform to this line. The opening of this bite we attained entirely in building over the lower jaw, establishing the relation by constructing a crown for the lower second molar as a starting point.

Our method of procedure was, first, the removal of all crowns and bridges from the right side of the mouth, the biscuspid and molar being thus prepared for the reception of our crowns, and the construction of the indirect models for them. Impressions were now taken of the entire mouth, and these indirect models were placed in position. Models were run and mounted on an anatomic articulator, as I believe the indirect method of crown construction, especially when changed relations are

to be attained, to be the best method to follow.

Wax crowns were next built on the lower molars to sufficient height and cusp formation to insure a balanced occlusion with the cuspid on the opposite side in lateral occlusion. In doing this, the upper first molar, especially the lingual cusps, had to be so trimmed and reshaped on the plaster cast as to accommodate the excursion of the wax crown in occlusal movement. These crowns were then transferred to the mouth; an impression was taken, and this one unit completed.

The next step was the preparation of the upper abutments for the same side. Before completion of this upper bridge, we performed this same operative procedure on the opposite side, completing both lower bridges. In determing the depth of the lower cusps for our lower molar dummies, we took the overbite as a guide, and I may say that it is a very definite guide to follow.

We now proceeded to complete the attachments for the upper left side. To attain the proper balance between the upper first molars on one side with the cuspid on the opposite side, we adjust the band of aluminum or copper to proper contour and length to allow for occlusion, and fill this band with the inlay wax, softening and forcing it to occlusion over the tooth to be crowned. The patient should close in central occlusion, and while the wax is still in the modeling state, should give all the lateral and forward occlusions, coming back to central occlusion, from which the model is chilled with cold water. At this point one can, by keeping an eye on the wax pattern in the mouth, have the patient give all the various occlusal movements, and note the ex-

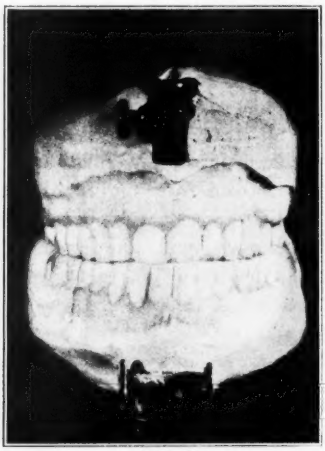

Fig. 11.—Case shown in Figure 10 completed with fixed restoration showing forward occlusion. Incisal and molar balance may be noted.

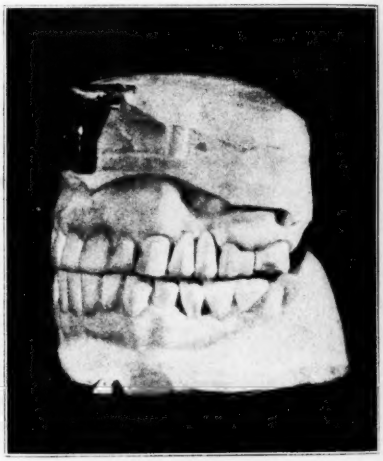

Fig. 12.—Case shown in Figure 10 in left lateral occlusion. Molar balance may be noted.

cursion of the cusps and the opposing occlusal planes, especially in their travel from one lateral occlusion to the opposite. If the wax pattern does not move under these various forces, we may be pretty sure that the occlusal impression is correct. From this point, we proceed to complete the crown. The lower bridges are now placed in position, together with the upper abutments in

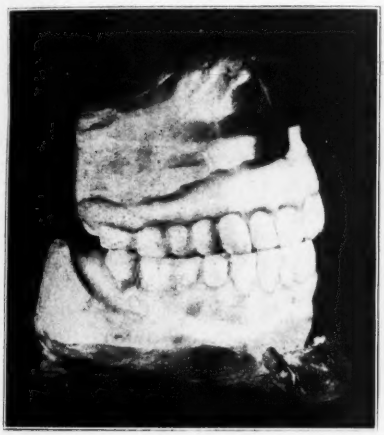

Fig. 13.—Case shown in Figure 10 in left lateral occlusion. Cusp occlusion from cuspid back may be noted.

their positions, and the case tested out for balanced occlusion.

The case is completed to this point by having the patient mill in the anterior and lateral occlusion, by the use of a milling paste, made of a retaining powder and water mixed to a thick gelatin as a carrying base, in which has been incorporated as much carborundum powder as the gelatin mass will easily take up. This will adhere to the occlusal surfaces and is very efficient in its action.

The use of high alloyed golds has been criticized and indicted severely by some, who claim excessive traumatic injury, as the chief charge against them, owing to their hardness. To my mind, this criticism is unjust and unfounded, and were more attention paid to tooth form and correct occlusion, the real reason for the traumatic injury would be found. In all restorations, especially those in which we are dependent on the material used to retain

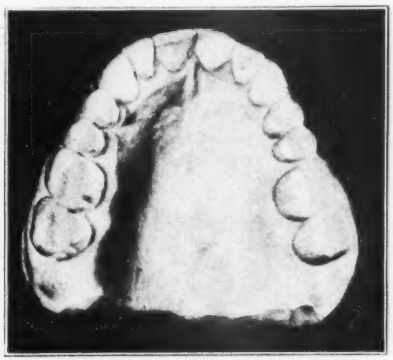

Fig. 14.—Occlusal view of case shown in Figure 10 completed, illustrating necessary tooth anatomy.

the occlusions we establish, it is obvious that we must employ alloys the main physical properties of which must be a hardness approximating the enamel of a tooth, and of sufficient rigidity to withstand the forces of occlusion, clinging to the abutments without spring or cleavage, which would result in cement disintegration. In all cases in which it is possible, bridges should be worn for a period before cementation, to give the operator the advantage of removing the bridge, as it is much easier to correct minor occlusal defects that have developed by the involuntary

movements of the jaw during mastication, and are exhibited by small burnished spots here and there on the occlusal surfaces.

We are now ready for the impression that completes the upper bridges of the case. In making these models, as in this particular case, all teeth that have a direct bearing on the occlusion must be of some material that will not lose its occlusal surface. In our practice, we use a high grade technic cement, for the reason that it is easy to handle.

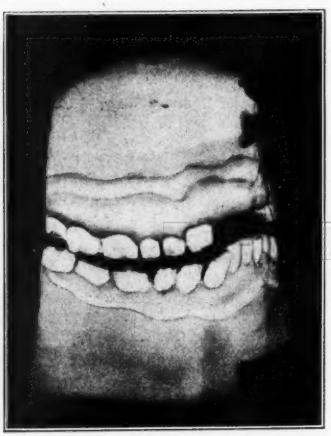

Fig. 15.—Method of building up cases in the wax to proper length in opening bite cases, as a necessary means of diagnosis.

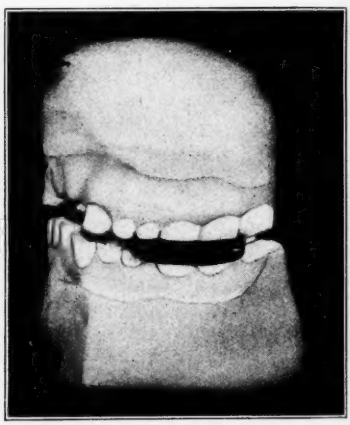

Fig. 16.—Vulcanite splint used for the transfer of diagnosis on the instrument to operative procedure on the patient.

Figure 11 shows the case finished, in forward balanced occlusion.

Figures 12 and 13 illustrate the case in lateral right and left balanced occlusion. Figure 14 illustrates the occlusal surfaces of the upper case, shown for the reason that I wish to bring out the positive necessity of tooth form, especially in upper first molars, whether they be crowns, pontics or inlays. The upper first molar is rhomboidal. The distolingual cusp is prominent, and it is this one surface in the anatomy of this tooth that accommodates the buccal cusp of the lower second molar, in the downward forward thrust of the mandible, in the act of lateral occlusion with the opposite side of the mouth, and if, through neglect in operative procedure, these certain features in the tooth anatomy are not maintained, balanced occlusion is not attainable.

In a case in which, through an accident, the four upper incisors were lost, the impossibility of anterior restoration without adequate opening of the bite to a balanced occlusion was apparent. To arrive at the operative procedure to be followed, the case was first built up in wax to a balance, as shown in Figure 15.

To transfer the diagnosis thus made to a working basis, the wax restorations on one side of the mouth are now re-

moved and a splint waxed up and vulcanized, as in Figure 16. This splint can now be used to maintain es-

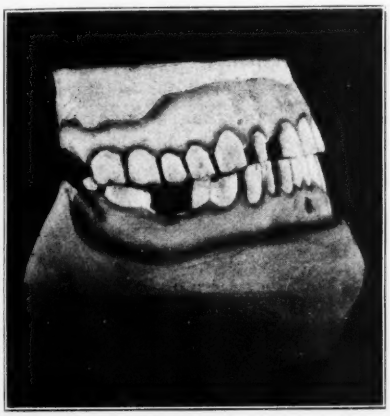

Fig. 17.—Appearance of case when opening the bite, necessary by reason of excessive overjet.

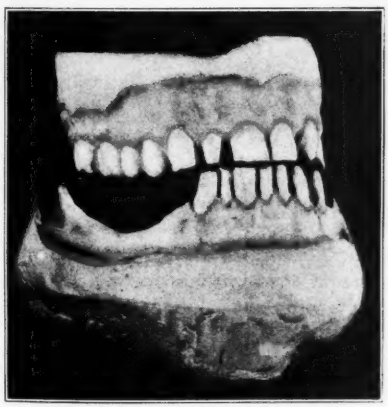

Fig. 18.—Modeling compound splint of case shown in Figure 17 to determine location of mandible in new position.

tablished relations while the restorations on the opposite side are being made.

The uses of these splints are many, and they can be applied to any part of the mouth, either anterior or posterior, and transcribe the diagnosis made on the study models to a definite method of procedure.

Figure 16 shows the models of a case in which the lower six anterior teeth presented an occlusal plane entirely different from that of the bicuspids and molars, the plane of the

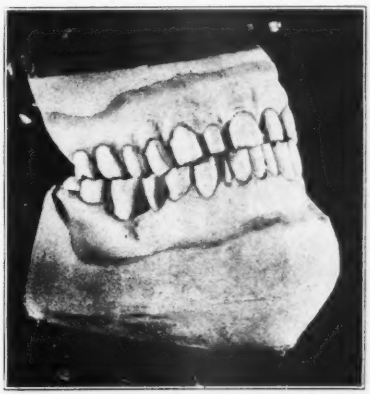

Fig. 19.—Case shown in Figure 17 corrected.

posterior teeth being about 2 mm. lower than that of the six anterior.

The result in this case was a serious traumatic occlusion affecting all anterior teeth above and below. In the treatment of this case, opening of the bite was plainly indicated.

The case was mounted on a Monson instrument and was allowed to set until the anterior teeth cleared in the forward occlusion, which gave in central occlusion a decided intrusion of the lower jaw. As the next step in diagnosis, the position that the lower teeth could occupy comfortably under the changed condition being determined empirically,

by bringing the lower jaw forward to a position in which the cusps of the upper and lower teeth seemed to interdigitate properly.

Splints were now made by pressing modeling compound over the lower bicuspids and molars on both sides and closing the instrument, and chilling. The impressions of the upper teeth in the compound were trimmed away until only shallow imprints of the upper teeth remained. (Fig. 18.)

Splints were now transferred to the mouth and the patient was instructed to close. Should the new position be easily taken, it is safe to build to case accordingly. Should the reverse be true, successive trials will have to be made until the proper position is found. Figure 19 shows models of the completed case.

Many of these cases are handled with more certainty by constructing a splint to be worn until such time as the mandible assumes its new position definitely, as it is a serious thing to reconstruct the mouth, with all the operative procedure attendant on it, only to find on completion, after the splint has been worn for some time, that the relations are incorrect.

I am of the opinion, and it has been my experience in my practice, that it is safer to construct cusp relation in harmony with the condyloid path present in the individual case than it is to establish a new occlusion arbitrarily.

Fig. 20.—Case of malocclusion in adult produced by early extraction of first lower molars, calling for orthodontic treatment previous to restoration work.

Fig. 21.—Case shown in Figure 20 arbitrarily moved to incisal occlusion preliminary to orthodontic treatment.

ORTHODONTIA AND MOUTH RESTORATION IN ADULT CASES

I am aware that in describing the remaining cases I am going against precedent, and that many of my audience will doubt the wisdom of the procedure. But owning to the fact that in working in conjunction with Dr.

J. N. Pike, an orthodontist of our city, I have been able to accomplish some lasting results in cases of dental restoration in which such results would not have been possible without orthodontia, I feel free to give the cases as a part of this paper.

A position of teeth in the jaw that assures proper absorption of the forces of mastication is just as fundamental as properly balanced occlusion. In a great many cases we find them mal-

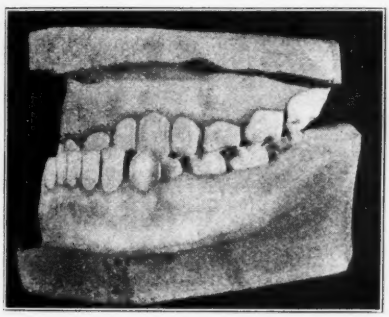

Fig. 22.—Extreme adult case of protrusion of the mandible.

posed, owing to early losses of teeth, especially first molars. We also find, when we open a bite and remove malforces, that these same teeth have a tendency to come to occlusion.

Figure 20 shows models of a case now under treatment. In this patient, a woman, aged 24, the early extraction of the first molars had produced a severe type of malocclusion, the bicuspids on either side closing entirely lingual to the uppers, and the six lower anterior teeth closing in contact with the gum tissue.

The mandible was moved forward, as shown in Figure 21, and further orthodontic treatment was given to assist the malposed teeth to their new position. I hoped to have this case completed at this time, but could not. But I can say that the bicuspids are almost in occlusion, and, at the time of this writing, Dr. Pike is devoting his attention to righting the first molars. The end result will be that I will simply have to place it in small bridges supplying the lower first molars.

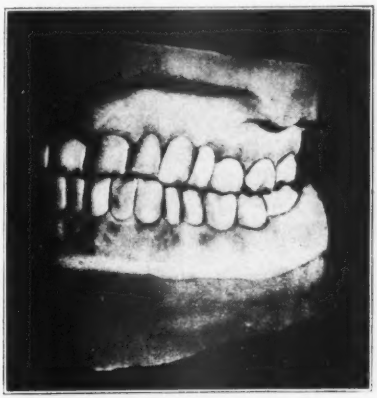

Fig. 23.—Case shown in Figure 22 after the mandible had been retracted by orthodontic treatment and the case completed with fixed restorations, the bite not being opened.

Figure 22 illustrates an extreme protrusion of the lower jaw, with relative facial deformities, in a man, aged 36, which was treated in conjunction with Dr. Pike and in what I consider a remarkably short span of time. He commenced treatment of the case, December 1, and by the middle of March following I had dismissed the patient, the case being thus completed in about four months. Figure 23 shows the completed case. A year has now elapsed and the patient has been in perfect comfort. I believe you will agree with me

that, without the aid of an orthodontist, we would at least doubt our ability to give this patient an acceptable restoration.

The roentgenograms (Fig. 24) illustrate a case treated in 1911. The patient, who was then about 40, had been wearing a partial plate for some time. The centrals were widely separated, as well as off center. Dr. Pike brought them into normal position, after which I constructed a full upper bridge. I am showing three views, for the purpose of giving as good a view of the periodontal and apical areas as possible. As I was not in the habit of making roentgenographic surveys when I took care of this case, I was much surprised to see the impacted cuspid.

I do not wish it understood that I am an advocate of the full upper bridge; yet, with a proper balance and retention, many of them have done service for years.

Fig. 24.—Case of thirteen years' standing. The central incisors were moved to proper position previous to insertion of the full upper fixed restoration.

I have attempted to bring out as clearly as possible a few of the fundamentals of crown and bridge restorations, as I see them. Doubtless there are many points on which we may disagree. However, disagreement stimulates constructive thought, and constructive thought produces progress.

EDUCATION OF THE PUBLIC IN MATTERS OF DENTISTRY IN GENERAL AND PERIODONTOLOGY IN PARTICULAR

By C. B. FOWLKES, D.D.S., New York City

(Read before the American Academy of Periodontology, Atlanta, Ga., Oct. 7-8, 1924)

IN OUTLINING a plan that the Southern Academy worked out the past year, I shall first discuss publicity as it is related to the public interest, as well as to the dental profession, with particular reference to periodontia. While all subjects pertaining to dentistry should be given publicity, there are a few that are most urgent at the present time. Mediums available for that publicity will be discussed and a few suggestions offered.

Education implies two component parts, the instructors and those to be instructed. Apathy on the part of either is deadly to success, when considered as individual to individual and when considered as group to group.

General apathy has had widespread effect in the realm of dentistry so far as educating of the public is concerned, manifest in indifference on the part of the dental profession as instructors, and ignorance plus indifference on the part of the public as those to be instructed.

One need only be chairman of a committee whose work is purely altruistic to realize how little cooperation one gets from the dentist, and no imagination is needed in order to realize how little the public want to be educated.

This apathy can be defeated and this indifference be overcome by enlisting the help of a body of men and women who have the vision of preventive dentistry. We need only to plan the battle and the victory will be won.

The first battle the dentist needs to wage is that of building better tooth and bone structure for young America, through diet and the conservation of teeth by prophylaxis and better dentistry.

DIET

The educational committee of the American Academy is to be congratulated for the work it has done along the lines of diet as related to tooth and bone structure. Diet is as much a dental problem as it is a medical problem, and when we look about and see what the American people are eating, it would seem that the medical world has lain down on the job, or the problem is too great, and they need our help.

With the data that has been furnished recently, there is no excuse if we do not assume the rôle of educators.

BETTER PROPHYLAXIS

The dental profession has not yet caught the slightest vision of the possibilities of prophylaxis; and if the dental profession has not, how can the layman be expected to grasp its potentialities?

The average dentist does not practice scientific prophylaxis because, in the first place, few of the dental colleges teach

their graduates expert prophylaxis. Most dentists do not know how to clean teeth, much less to carry out the more expert diagnosis and treatment of potential disease. In the second place, it is too difficult for the average dentist to command a fee commensurate with that he receives for time given in restorative work, even if he is competent.

Through educating the public as to the value of preventive dentistry, this situation can be remedied.

I would make the following suggestions to the members of the American Academy: Use your influence with the colleges to get a better training course established in prophylaxis, in order that the young men may catch the vision of preventive dentistry; to establish a standardized technic to be used at the chair, and, if such a thing is possible, to standardize a technic to be used by the patient in home care of the mouth.

Leaders in the dental profession are divided, seemingly, as to the technic to be used in brushing. Who is better qualified than the members of this Academy are to offer to the profession a standard system of brushing? Once accepted and adopted by the profession, it could be given to a committee on education and broadcast to the world, together with other educational articles.

An article needs to be written and given to the profession on the proper kinds and the use of dental floss; one, also, placing the proper values on tooth pastes, powders and mouth washes, and condemning the misleading statements one sees every day in flagrant advertising of certain nostrums.

Pastes, powders and mouth washes have their proper place and values, and who is more competent to give the truth to the public than are the members of this Academy?

BETTER DENTISTRY

How many of us see amalgam fillings that are properly contoured and properly polished, so there will be no injury done the periodontiums? How many inlays, crowns, bridges and partial plates that do not produce trauma or impinge on the soft tissues of the mouth?

It's a safe estimate to say that 75 per cent of the restorative dentistry done today is not in keeping with the highest standards. There cannot be health where there is faulty dentistry, and no class of men in the profession see more of the ravages of disease and infection from poor dentistry than does the periodontist. No class of men are more dependent on the general practitioner for success in their work than is the periodontist.

There is no better way to correct this situation than to educate the public in articles through the press as to what constitutes good and bad dentistry.

The general practitioner will give better service, if he can get a better fee. The public will pay a better fee and will demand better work if they are made to realize that ill health and even death is often the result of infection from poorly constructed dental work.

Plain forceful articles explaining the difference between good and bad dentistry should be written and broadcast from one end of this country to the other.

MEDIUMS BEST SUITED TO PUBLICITY

The daily press, weekly papers, magazine articles, state health organizations and public school clinics are the mediums best suited to publicity.

Just why the dental profession has not used the public press more, I cannot understand, since I have found that newspapers are glad to receive such educational articles. However, the

question is *shall* we conduct an educational campaign on a very broad scale, through the press?

The medical profession has articles on health in the daily papers continuously. They even write articles on dental subjects.

Why shouldn't the leaders of the dental profession be recognized in the press on subjects of dentistry that are vital to the health of the nation? Whether such articles are signed and the authors given credit would be a question to be decided by those in charge of the work.

The dental profession has done a great deal of educational work through health organizations. It has also done a great work through public school clinics.

We frequently see articles in magazines, and wish to call your attention particularly to articles which have come out recently in *Collier's Weekly*, written by men who are not dentists.

A paper on this subject which I shall read before the Section on Mouth Hygiene and Public Instruction of the American Dental Association, is to be discussed by Mr. John Kennedy, extension editor of *Colliers'*. In this paper I shall suggest that a series of articles be arranged and sent out under the auspices of the American Dental Association.

EDUCATIONAL WORK DONE BY THE SOUTHERN ACADEMY, THROUGH THE DAILY PRESS

About ten months ago, the Southern Academy appointed a committee to arrange for a series of articles for publication in the public press. This committee was instructed to work under the following restrictions:

1. The endorsement of a committee from the American Dental Association, under whose auspices such work would come, was to be secured.

2. No names of local men should appear in connection with the articles.

3. All articles must pass through the hands, and receive the endorsement, of the committee appointed for that purpose.

4. All articles should be given as nearly simultaneously as possible to papers in the chosen field of operation.

After all conditions had been met, the committee began the series in the *Birmingham News*.

The field chosen was that of the southern states. To meet the requirements of furnishing copy for other papers, the problem was solved by the *Birmingham News* furnishing us 1,000 reprints of all articles in groups, as they appeared. At first we thought this would be quite an expense, but the managing editor was so pleased with the series and with the response from health organizations and women's clubs, calling for reprints, that the *News* offered to furnish us as many reprints as we desired, free of cost. They not only furnished us 1,000 of each group, but printed 500 extra for free distribution in the district surrounding Birmingham. The *News* also wrote a letter to the Southern Academy, thanking them for the work they were doing, a copy of which you will find with the set of reprints that I have with me.

The articles were used in the public schools of Birmingham, and one steel organization asked for 3,000 reprints of the series, for distribution among its employes.

The managing editor of the *News* stated that this was the most popular series they had ever published.

To give you some idea of what this kind of publicity means: the Birmingham News has a circulation of about

100,000 in their Sunday edition and a little less during the week. Multiplying the circulation by sixty-six, the number of articles written, means that more than 5,000,000 articles were distributed in the Birmingham district alone.

As a result of our committee getting in touch with the oral hygiene chairmen of the southern states West Virginia has the series running in ten daily papers; North Carolina, through their board of health, has distributed them to 325 papers in that state. South Carolina has asked for reprints for twenty daily papers. Arkansas has the series running in four daily papers. Georgia, Florida and Mississippi are using the series, or planning to do so. Tennessee, Louisiana and Virginia have asked for reprints, but just what has been done or will be done, we cannot say.

Reprints were mailed to the presidents of every state dental association in the United States and to about fifty members of the American Academy. These reprints were mailed with no names of the committee appearing thereon. The presidents of the New York, Montana and New Mexico associations wrote to the *Birmingham News* to know how they could obtain the series. As a result, New Mexico has the series running in five daily papers; Montana in six and New York State in one. There have been numerous calls from health organizations in all sections of the country; all of which shows conclusively that there is a demand for such articles.

EXPENSE OF THE SOUTHERN ACADEMY PLAN

There has been an expenditure of about $75.00, covering postage and every expense. We furnished reprints for every state that could use them, free of cost, and still have a great many left for use. The only real expense to the committee was postage and the cost of having the articles copied by an expert typist.

THE PROPOSED PLAN

I should like to suggest that the members of the American Academy use their influence to get the American Dental Association to undertake a publicity campaign in the daily press and that a series of articles covering every phase of the dental question be arranged and sent out under the endorsement of their new department of health and educational work; and that the members of this Academy use the talent they have in furnishing this department with articles on subjects that the periodontist is best qualified to handle.

If we, through education, help to build better teeth and better health for our country, we shall be conscious of a duty well done.

Since this paper was written nearly a year ago, I should like to state that, owing to the wide publicity given to the Southern Academy plan of publicity by THE JOURNAL, *Dental Cosmos* and *Oral Hygiene*, the entire supply of reprints of articles written and compiled by the Southern Academy Committee has been exhausted. The articles are being used in thirty-seven states in this country and four sections of Canada, and in nine foreign countries: Greece, Australia, Brazil, Jamaica, South Africa (Capetown), Africa (Massawa Eritrea), Czechoslovakia (Prague), Porto Rico and Hawaii.

Besides the state organizations and foreign countries, thirty-five local dental societies and health organizations have asked for the Southern Academy group of articles. The total expense paid by the Southern Academy was $135.00.

THE TREATMENT OF DENTO-ALVEOLAR HEMORRHAGE FOLLOWING TOOTH EXTRACTION

By ST. CLAIR DUKE, D.D.S., New Orleans, Louisiana

(Read before the First and Second Districts Dental Society, New Orleans, La., Jan. 21, 1925)

HEMORRHAGE following the extraction of teeth is usually negligible and causes little concern to the dentist. This is due to the natural coagulating property of the blood when exposed to the air and to the tissue juices released by the traumatism, and to the modern employment of epinephrin or one of its congeners, with the local anesthetic employed, the arterioles being contracted, allowing a sufficient time for a firm clot to form.

It is the unusual and unexpected that causes anxiety, and a bleeding alveolus that continues to ooze in spite of the employment of known local measures for its control is by no means an exception to the rule; for we all know that local measures are not always successful in controlling hemorrhage. A number of cases have been reported in the literature in which death has resulted from long continued hemorrhage following the extraction of a tooth. It was, therefore, thought worth while to discuss briefly the nature of this class of hemorrhage, and to report a case successfully treated with a new remedy in my hands recently.

Hemorrhage may be capillary (arterial), venous or both. It is due primarily to traumatism in the extracting process, which breaks up the small blood vessels.

The local means ordinarily employed for its control, when unduly prolonged, consist in the application of pressure, styptics or astringents and blood coagulating agents. Cotton, gauze or modeling compound are usually employed as pressure agents. Their action may be assisted by having the patient exert pressure with the uninjured jaw acting as a fulcrum. As styptics, tannic acid, solution of ferric subsulphate, cotarnin hydrochlorid, epinephrin and other chemicals have been employed successfully. My personal preference is for epinephrin chlorid solution, 1-1000, applied on cotton or gauze. Epinephrin has the property of being cleanly and easily applied, does not disturb the tissues and acts quickly by contracting the arterioles. Among blood coagulants may be mentioned coagulin, coagulose and hemostatic serum. The first two are powders, and the last named, hemostatic serum, a liquid which also may be applied locally on cotton or gauze pledgets.

As before implied, there is a certain class of hemorrhage that will not yield to even the most heroic local measures. The patients presenting this condition are usually hemophiliacs or "bleeders," as they are commonly called. The condition is due either to an inherited state or to disease, there being some element lacking in the blood, so that

normal coagulation does not occur. These patients require systemic treatment to improve the blood coagulating constituents which, according to Howell, are thrombokinase, calcium, prothrombin and thrombin. These elements should be present in a certain ratio in the blood in order that the thrombin may act, forming fibrin, which enmeshes the formed elements, calcium, etc., causing clot formation. Calcium salts, in the form of calcium lactate, 5 grains every three hours, have been given for the purpose of supplying the calcium element, but most investigators claim that the oral administration of inorganic calcium is valueless. As it does no harm, however, it may be administered in the above named dosage.

Normal horse serum in 10 c.c. doses, given hypodermically, is usually effective in restoring the normal coagulating elements of the blood. It should be used fresh, however, and it is difficult to obtain it in a fresh condition on the market. The large bulk of a 10 c.c. injection is also a disadvantage. Furthermore, there is the danger of serum sickness and anaphylaxis, especially in those who have previously been injected with a serum. Hemostatic serum has the advantages of smaller bulk (the dose being from 2 to 5 c.c.), greater coagulating power and apparent freedom from danger. Injection of hemostatic serum may be repeated every two to three hours if necessary. It is rarely necessary to administer more than one dose.

In patients giving a previous history of hemorrhage, the coagulating time of the blood should be determined, and if it requires a longer time than normal, which is within five or six minutes (average three and one-half), hemostatic serum may be administered in 2 to 5 c.c. doses several hours previous to the operation, in order to bring the coagulating power of the blood to normal.

The following is a report of a case recently occurring in my practice, demonstrating fully the value of this agent.

The patient, Mrs. E. M., aged 32, had a lower second bicuspid extracted. She was apparently in good health. I had extracted a tooth for her four or five months previously without any trouble following. She gave a history, however, of having troublesome hemorrhage after tooth extraction eight years previous. The tooth socket was given the usual treatment, and the patient returned to her home. About three hours afterwards, she called me, stating that the opening was bleeding freely. I visited her home, and packed the socket with a cotton pledget saturated with a solution of epinephrin, followed by administration of epinephrin orally in 10 drop doses. Hemorrhage stopped almost immediately. At from three to five hour intervals, however, the hemorrhage reappeared, and it was necessary to replace the cotton soaked in epinephrin. This continued for three days. The patient was becoming weakened from loss of blood, when a physician friend advised that I administer 2 c.c. of hemostatic serum hypodermically. This was done on my next visit to her home. The hemorrhage stopped within twenty minutes and did not recur.

SUMMARY

1. Hemorrhages following tooth extraction may be local or constitutional.

2. Local hemorrhage is usually easily controlled by the application of pressure agents or styptics.

3. Constitutional hemorrhages usually require systemic remedies, the preferable agent being hemostatic serum in from 2 to 5 c.c. doses.

DEPARTMENT OF DENTAL HEALTH EDUCATION

THE MASTICATING MACHINE

THE TEETH AND THEIR SUPPORTING STRUCTURES*

(Compiled by The American Academy of Periodontology, September, 1924)

The masticating machine includes not only the complete set of teeth and their supporting structures but also the muscles of mastication, the lips, cheeks and tongue.

When the teeth are set correctly in the jaws, they form their part of an efficient masticating machine. They are the product of millions of years of development and adaptation. Between the scale of the primitive fish, turned up for biting, and the highly complicated masticating mechanism of civilized man there is as great a period of development as between the fin of this same fish and the human hand. In the struggle for existence, the survival of man is the result of the development and adaptation of teeth and jaws, no less than the development of hands and brain. In the evolution of the skull in human beings, the level of the joint of the jaws has been continually raised above that of the teeth. From a simple hinge, this joint of the jaws has become one of the most complicated mechanical structures of the body.

The teeth are arranged with the shearing, or incisor teeth, in the front, and the crushing teeth, or bicuspids and molars, in the back of the mouth. The long, strong cuspid teeth, used by animals for a ripping stroke, are on the corners, where their great root length gives them much strength. The muscles of mastication are attached at the back of the jaws, so that the greatest crushing force is in the back of the mouth.

The set of natural teeth, with its surrounding structures of bone and soft tissues, is marvelously adapted to the part it plays in the process of digestion of food.

Four groups, each composed of similarly shaped teeth, make up the natural adult set, eight incisors, four cuspids, eight bicuspids and twelve molars. Each tooth is perfectly fashioned to do its own particular work.

THE STRUCTURE OF A TOOTH

For our consideration, a tooth may be divided into the crown, the root and the pulp. The main body of the tooth is made up of dentin, which is covered

*Bulletin No. 3, Part 1. This is one of a series on the teeth and their care prepared for the information of the public.

on its crown portion with enamel, and on its root portion with cementum. The pulp occupies the central portion of the tooth.

(a) Dentin.—The human tooth is made up, for the most part, of a substance called dentin. This is a springy, ivory-like material, which is hollow in the center to contain the pulp, incorrectly called nerve. The dentin is covered on the outside by two substances: (1) enamel (the hardest and most durable substance in the body), which covers the exposed part of the tooth, known as the crown, and (2) cementum, a thin, bonelike layer covering the root of the

Fig. 1.—Simple hinge joint of the jaws of a shark. (After Noyes.) The teeth are almost on a level with the joint.

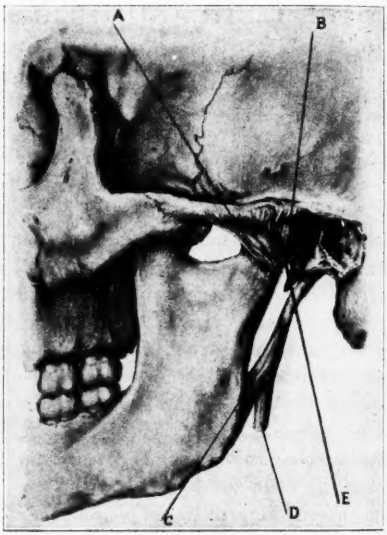

Fig. 2.—Highly developed joint of the human jaws. (After Bromell.) The joint is above the level of the teeth and is here shown with some of the ligaments that hold it in place: *A*, external lateral; *B*, capsular; *C*, stylomaxillary, and *D*, stylohyoid. *E*, styloid process.

tooth. The dentin is made up of lime salts (such as are found in bone) that form the minute tubes through which run tiny fibers of sensitive organic matter. These fibers radiate from the pulp to the outside of the dentin, where the latter touches and is attached to the enamel and cementum. These little fibers keep the dentin moist and springy. If the dentin becomes uncovered by decay or wear, the presence of these fibers makes it sensitive to touch or to cold, heat, sugar and salt. The dentin is nourished through the pulp.

(b) Pulp.—The pulp occupies the central portion of the tooth and is made up of blood vessels, nerves and supporting tissues. It is large in the upper,

or crown, portion of the tooth and tapers off smaller toward the root end until it passes out from the tip of the root through one or more very fine openings and is connected with the blood vessels and nerves that surround the root.

(c) Enamel.—The enamel also is made up of lime salts, such as those in the dentin and in bone, but it has in it practically no sensitive organic matter such as the little fibers in the dentin. So the enamel is without feeling, and it can

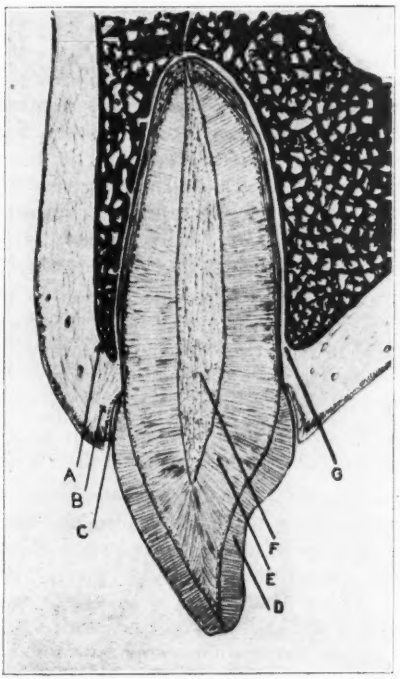

Fig. 3.—A drawing showing a cross-section of the parts of a tooth and its surrounding tissues. (Leonard.) *A*, bone or alveolar process; *B*, gingiva; *C*, crevice formed by gingiva collar; *D*, enamel; *E*, dentin; *F*, pulp; *G*, pericementum.

neither repair itself nor build new enamel. It has a grain that runs at right angles to the surface. It is affected by wear and tear or by chemical destruction just as rock is. If the enamel is once broken and the dentin becomes decayed beneath it, the enamel will chip off in large pieces. But otherwise, well-formed enamel, being the hardest substance in the body, is very durable and will withstand the usual wear of mastication. The *un*necessary use of teeth, as in

cracking nuts, or biting threads or hard candies may nick, crack or break the enamel, while chewing (of tobacco, gum, etc.) habits may result in the wearing away of the enamel on the tops of the teeth.

(d) Cementum—The thin bonelike layer of cementum that covers the tooth root has no feeling, but it has nourishment, which the enamel lacks. The cementum can be repaired if injured. The cementum holds the fibers of the thin layer of gristle-like substance, which is similar to the periosteum covering the bones and is called the pericementum.

THE TISSUES SURROUNDING THE TEETH

(a) Pericementum.—The pericementum lies between the root and the surrounding bone of the jaws and attaches the tooth root to the bone. The pericementum builds the cementum and the hard shell of bone that surrounds the root and forms the bony socket in which the root rests. It is a kind of shock absorber, and it acts as a cushion to give a slight movement to the tooth so that it will not break off easily when hard food is chewed. It also reports the sensation as to how much pressure is being put upon a tooth in biting and chewing.

(b) Alveolar Process.—This is the name given to the bone surrounding the teeth. This bone is a projection (process) of the jaw bone, which grows around the roots of the teeth as they are developing in their positions in the dental arch. It is called the alveolar process because of the alveoli (sockets) in which the roots are imbedded.

(c) The Gum Tissue.—The gum tissue surrounding a tooth is more correctly called the gingiva, but the better known term will be used.

The bone surrounding the roots of the teeth is covered, near the crown portion of the teeth, with a thick, tough, fibrous tissue, which, in turn, is covered with a special kind of skin, called mucous membrane. These tissues, with their network of blood vessels, we call the gums. The gums, when healthy, are tough and not very sensitive. They have a rich blood supply, so that if they are injured they heal readily. These qualities, together with the fact that the surface is covered with a thick skin, prepare the gums to withstand the hard usage to which the teeth and jaws are subjected. In fact, the teeth and gums need harder usage than the present-day diets of soft foods give them.

The gum fills in the space between the teeth and forms a little protecting collar around the enamel of each tooth. When food remnants, molds or bacteria in the mouth are allowed to accumulate on the necks of the teeth, the tissue tone of the collar is lost, and thus germs are allowed to slip into the crevice under the little collar and to find their way into the deeper tissue beneath the mucous membrane, causing inflammation of the gums.

EFFECT ON THE MASTICATING MACHINE OF DEFICIENT DEVELOPMENT OF THE JAWS AND OF IRREGULARITIES OF TEETH IN STRUCTURE, FORM, NUMBER AND POSITION

The jaws, the teeth and their surrounding tissue are subject to the destructive effects of poor heredity, imperfect development, lack of use and disease.

A. Underdevelopment of the jaws during the growth period results in an inferior masticating machine.

There are other causes of poorly developed jaws, but one of the important and preventable ones is *lack of use.* In order to grow properly to maturity, the jaws require hard work from birth until the time the third molars, sometimes called "wisdom" teeth, have erupted. In other words, during the whole growth period, there is an especial need of vigorous exercise for the masticating machine so that all its parts may develop adequately.

Infants should be breast fed up to the age of about 9 months, not only because mother's milk is best for them, but because nursing at the breast is harder work for the jaws and gives better development than nursing from any artificial nipple so far devised. Biting on teething rings or other smooth objects, *not* so-called "pacifiers," by teething babies stimulates the growth of the jaws to make room for the teeth to erupt in their right places.

It is essential that growing children have hard, toasted, unsoaked breads, preferably whole grain, to eat because they require slow, hard chewing. Vigorous use of the jaws and teeth is an important measure for preventing irregularities in the positions of the teeth, and an aid in keeping healthy the teeth and the tissues that support them.

The use of both sides of the jaws during the growing age is necessary. Otherwise, an unequal development may take place, and the side used will then show better growth of the jaws, the face and the skull than the one unused.

Without this growth-producing use of the jaws and teeth, there may be an underdevelopment of the jaws leading to narrowed arches, crowded teeth and cramped air passages of the nose, where adenoids may develop. Faulty development of the face, the skull and the chest may also result from these conditions.

Other causes of poorly developed jaws are mouth-breathing, which, if persisted in, brings about a narrowing of the jaws and a protrusion of the upper teeth; and thumb or finger sucking, which develops deformities because the continued pressure pushes the teeth out of position while the bone is gradually condensing around them.

B. Irregularities in the position of the teeth in the jaws may be slight or pronounced, but, in many cases, they affect more or less seriously the normal, and therefore the most efficient, use of the teeth.

There are those irregularities in the position of the teeth that occur with the eruption of the teeth, which result from mutilation of tooth structure and incorrect dental restorations, and those following the loss of one or more teeth. The first group includes all those cases of malocclusion, or wrong position of the teeth, which are present from childhood and which have many causes, one of them being the lack of development of the jaws previously discussed.

Some of these irregularities allow only a few teeth in the lower jaw

to touch correctly those of the upper jaw. In others, the front teeth cannot come together at all, and again the teeth of both arches are so misplaced that they are only half as serviceable in masticating food as they would be if they were in their normal places. At times, these irregular teeth occlude, or come together, in such a way that more stress is brought to bear upon certain teeth than upon others. This results in a sort of bruising or irritation of the tissues that support these teeth, which, in grown persons especially, may bring about a breaking down of the gums, the pericementum and the bone around the affected teeth.

There should be a noticeable space between all the front teeth at the age of about 4 years. If teeth are tight together at this age, it is advisable to consult a dentist to find out whether there will be room enough later for the larger permanent teeth to take their places. Also,

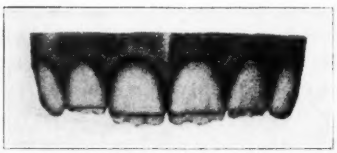

Fig. 4.—Imperfectly formed enamel. (After Black.) A condition that interferes with the delicate adjustment of the teeth of the upper and lower jaws.

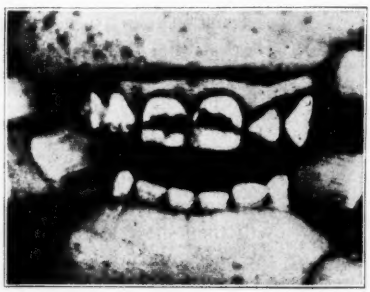

Fig. 5.—Mottled enamel. (After McKay.)

if the lower front teeth bite into the gums behind the upper front teeth, dental advice is needed. If there are teeth missing on one side of the jaw during the growth period, unequal development of the two sides of the face will usually result. Any serious irregularity in the position of the teeth prevents complete usefulness of the masticating machine. Loss of the normal space between the teeth may follow caries (decay) of the teeth. As a result of the loss of contact, a shifting of the teeth may take place so that they become irregular in position. This may cause the upper and lower teeth to strike each other at abnormal angles, which, in turn, results in injury to the gums and the other supporting tissues. Almost invariably, food will pack between teeth having caries on the contact surfaces, and injury to the supporting tissues follows.

C. While the teeth are developing, inadequate nourishment, and therefore a lack of the necessary tooth building materials, or disease of the child may produce teeth so imperfect in their form as to interfere with the delicate mechanical adjustment that should exist between the teeth of the upper and lower jaws.

Teeth that are peg-shaped instead of normal in form occur occasionally.

They are usually hereditary. Frequently certain teeth are missing. Extra teeth, usually small and peg-shaped, may be present. Enamel defects in color may also occur. Certain artesian well waters, such as are found in regions of the Dakotas south when used during the formative period of the teeth cause brown or black patches in the enamel, a condition called mottled enamel.

Sometimes teeth develop out of their proper positions because of lack of room and become lodged (impacted) deep in the bone and close to the roots of other teeth. This often causes serious trouble.

(a) Impacted teeth, in their effort to develop and erupt, may force other teeth out of position, causing a more or less serious maladjustment. This is more often true of impacted third molars than of any other teeth.

(b) Impacted teeth may press on nerve trunks in the bone or on the roots of other teeth until their pulps are exposed as a result of root absorption, thus causing neuralgia, headaches, nervousness and even certain forms of insanity.

(c) Impacted teeth may become infected by bacteria and cause deep abscesses, with consequent trouble from that source.

These disturbances are serious, and it may be advisable to remove impacted teeth whether they have given discomfort up to the time of their discovery or not. Impacted teeth are found by means of the roentgen ray.

LOSS OF TEETH

The loss of any of the natural teeth, unless it be perhaps the third molars, almost always brings about some degree of change in the relationship of the other teeth in the mouth unless the space left by the extracted tooth is retained by some artificial means.

The loss of the first molars is most harmful. Yet they are frequently lost for the reason that, in the child, they are often mistaken for deciduous ("baby") teeth because they come in quietly about the fifth or sixth year, back of all the deciduous teeth and normally before any of them are lost. They do not replace any deciduous teeth. These important teeth serve as guides for the position taken by all the succeeding permanent teeth as they erupt and are therefore necessary for normal formation of the natural denture. They are so far back in the child's mouth, so little used at first and so easily overlooked in cleaning the teeth that they are the most frequently decayed of all teeth. As a result, more than one-third of all adults in this country are without one or more of these vitally important teeth. The loss of any one of the four first molars means irregularity and possible undue stress on many teeth, which leads to their early loosening and loss. The loss of the lower first molar is especially serious. In most jaws, there is an overbite; that is, the upper teeth extend out over the lowers, and there is a tendency to force the lower teeth tightly together. When the lower first molar is gone, the adjacent tooth tips into the vacant space. This allows the

jaws to settle closer together and involves a readjustment of all the teeth. The teeth are shifted from their positions; the mechanical adjustment of the jaws is disturbed, and tooth after tooth gets into a position where it interferes with the jaw movements and receives undue stress. This stress, together with the shifting, greatly injures the attaching tissue of the root and makes it an easy prey for bacteria to invade from the tooth surfaces. The result is loosening, a bleed-

Fig. 6.—Impacted lower third molars. (After Winter.) Above: Roentgenographic appearance; below: roots of the teeth as shown if the outer layer of bone is removed.

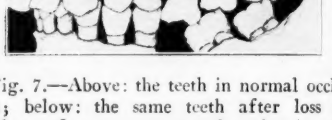

Fig. 7.—Above: the teeth in normal occlusion; below: the same teeth after loss of the lower first permanent molar, showing the serious effect of this loss. (Leonard.) The bite closes, driving the anterior teeth together; the lower molars tip forward and loosen, from stress; the lower anterior teeth shift lingually and distally; the upper anterior teeth are forced outward and loosened; the upper bicuspids are intruded and rotated, and the upper first molar is extruded and the pericementum degenerated.

ing gingiva and a pocket forming deep down along the root. A large proportion of the loss of teeth from dental periclasia (pyorrhea) results from this initial trauma. If the loss occurs years before the second molar erupts, the condition is not so serious, because the second molar may erupt into the position of the first. But after this period, it must be replaced by a bridge to hold the remaining teeth in their positions.

The importance of the first permanent molars to the health and usefulness of the masticating machine cannot be overemphasized.

TENTATIVE STANDARDS FOR DENTAL CLINICS*

A STUDY of dental facilities issued in June, 1924, under the title, "Community Dental Service in New York City" made evident not only that there was substantial shortage of needed services and facilities for dental care and prevention, but also that there was a grave lack of adequate and accepted standards in the policy, organization and technic of dental clinics and dental services in hospitals. In the hope of stimulating improvement in these directions, the Committee on Dispensary Development, under which the dental survey had been conducted, enlarged a small dental advisory body that had assisted in that survey. The appointment of subcommittees to study and report on the different phases of dental clinic policy and management was authorized. Their work was facilitated by Miss Clare Terwilliger, R.N., to whose devoted and effective work as secretary of the Dental Advisory Committee and its subcommittees whatever results have been accomplished are largely due. The present report is issued as a tentative formulation of standards for dental clinics in three types of institutions: medical, including hospitals, outpatient departments and unattached dispensaries; non-medical, including health centers, settlement houses and churches; and educational, or schools. It discusses the principles underlying dental work, the question of professional supervision and subjects for future study.

POLICY OF DENTAL SERVICES IN HOSPITALS AND OTHER ORGANIZATIONS

Dental service is widely varied, including such different forms of work as extracting, filling and cleaning teeth, as well as doing more involved work, such as oral surgery, the filling of root canals, and the construction of bridges and plates. These different forms of service vary widely in their relative importance to health and comfort, in the time consumed in their performance and in the expense required. Since facilities in hospitals and clinics are everywhere substantially short of dental needs, it is highly important to utilize the existing facilities in such ways as will yield the maximum results with

*Prepared by a professional committee under the auspices of the Committee on Dispensary Development of the United Hospital Fund: Dental Advisory Committee: Michael M. Davis, Ph.D., Chairman, Clare Terwilliger, R.N., Secretary, John C. Gebhart, W. J. Gies, Ph.D., James Greenough, M.D., Ellison Hillyer, D.D.S., Thaddeus P. Hyatt, D.D.S., Waldo Mork, D.D.S., John L. Peters, D.D.S., W. D. Tracy, D.D.S., Herbert L. Wheeler, D.D.S. Technical Subcommittees: Policy: Thaddeus P. Hyatt, D.D.S., Chairman, John C. Gebhart, Wallace Van Winkle, D.D.S., De Lan Kinney, D.D.S., J. S. Shields, D.D.S. Organization: W. J. Gies, Ph.D., Chairman, James Greenough, M.D., John T. Hanks, D.D.S., William S. Hubbard, M.D., W. D. Tracy, D.D.S., Maurice William, D.D.S. Oral Surgery: Waldo H. Mork, D.D.S., Chairman, Theodor Blum, M.D., D.D.S., Henry S. Dunning, M.D., D.D.S., Douglas B. Parker, M.D., D.D.S., Harold S. Vaughan, M.D., D.D.S., Alfred S. Walker, D.D.S. Records and Equipment: John L. Peters, D.D.S., Chairman, Charles J. Brophy, D.D.S., Martin Dewey, D.D.S., M.D., John T. Hanks, D.D.S.

the personnel, equipment and money available.

It was found in the dental survey in New York City that much waste of effort arose because of the lack of a clearly defined policy. Dental services in hospitals and clinics are relatively new, and policies often have not been formulated, but the kind of work undertaken has often been determined by individual or local considerations rather than as a result of a considered plan. For example, in one neighborhood that is a long distance from the dental colleges, a hospital dental clinic is doing plate work for all patients who cannot afford to go to a private dentist. The service that is necessary to put the mouth in a hygienic condition, such as cleaning, oral surgery and filling, is offered also. The dental clinic is so busy, however, that it cannot serve the hospital ward cases and the cases referred from the other clinics in the outpatient department. In another hospital, the services offered are oral surgery, fillings, plate work and an occasional cleaning. The dentist in charge is particularly interested in serum therapy and has not developed any service extensively except oral surgery.

There are two principles which should underlie the establishment of dental services in clinics and hospitals; first, the medical or health need, and second, provision for professional supervision. The need divides into three parts, diagnosis, prevention and cure. Provision for supervision should insure permanency to the project, high quality of service and facilities for teaching. The application of these principles constitutes a policy for conducting dental service. Since there are hospitals, detached dispensaries, public schools, health centers, settlement houses, churches and relief agencies offering dental service in New York City, it will be readily seen that there will have to be modifications of the principles according to the purpose for which each type of organization is in the field.

CHOICE OF TYPES OF WORK

All medical or dental work has the double purpose of curing or alleviating disease and of preventing disease or promoting health. Prevention is so vital a factor in dentistry that one of the first points to be considered in any dental policy is prophylaxis or surface cleanings of the teeth.

Prophylaxis has been looked on as a method of keeping the teeth clean and white so that they would look well and feel so. The really important element has been overlooked; namely, the protection of the soft tissues. By the removal of rough deposits from the teeth at the gum margin and under it, the soft tissues are saved from abrasions that may become ports of entry for infectious germs. The various forms of curative work should be undertaken as is required by the conditions suggested below. Modifications may be necessary on account of the size of the institution, the staff or the funds available, but the committee wishes to emphasize the desirability of adhering to the order stated in order to maintain as the ideal the ultimate health of the patient.

HOSPITALS, OUTPATIENT DEPARTMENTS AND DETACHED DISPENSARIES

The hospital is for the care of the sick in bed; the hospital outpatient department and detached dispensary exist for the purpose of caring for the ambulatory sick. Their obligation to the patient in assuming responsibility for hospital care is both diagnostic and cura-

tive. Therefore, in such institutions, the types of work recommended for adults that are given below are listed in the order of their importance in clearing up systemic disease. The reparative and the restorative work are important in that a proper chewing surface is necessary to digestion, but these types of service can be obtained at the office of a dentist or at a dental college after the hospital care is completed: (1) prophylaxis, (2) diagnosis, including roentgen-ray examination, (3) removal of unsavable teeth, (4) oral surgery, (5) treatment of pyorrhea, (6) reparative work and (7) restorative work; for children: (1) prophylaxis, (2) diagnosis, including roentgen-ray examination, (3) removal of unsavable teeth, (4) prophylactic fillings for the preservation of the first permanent molar or any other permanent teeth and (5) silver nitrate treatment for decaying deciduous teeth.

CHOICE OF PATIENTS

A policy in regard to a choice of patients should also be adopted. If this is not done, a clinic is liable to become so crowded with patients applying for dental work only that physicians in other clinics of the outpatient department or detached dispensary who need the cooperation of the dental service become discouraged and do not refer their patients. The choice should be made in the following order: first, emergency cases (it is always understood in all clinics that emergency cases take precedence); second, patients who have come to the hospital, outpatient department or detached dispensary, for conditions other than dental in which dental work will serve as an aid in therapeutic treatment of general medical and surgical conditions, or as a preventive measure; third, hospital personnel; fourth, children; if the institution has time, space, and personnel to do additional work, the clinic might receive for dental work children for all types of service and finally, adults.

There seems to be hesitancy on the part of many about offering oral service of any kind to pay patients. The committee feels that there should be no more hesitancy about giving prophylactic treatments and a mouth examination, unless a patient is too ill to stand it, than there would be about demanding urinalyses or blood counts. When there is a better understanding of the importance of mouth hygiene by laymen, dentists and physicians, organization of dental service will be facilitated.

SCHOOLS

The public schools are for instruction and are responsible for the teaching of hygiene, of which mouth hygiene is an important part. In most cases, it has been neglected entirely or taught so indifferently in the homes that it is necessary in the schools not only to examine the children's mouths in order to indicate to the parents the dental work needed, but also to provide prophylactic care in order to demonstrate its effect on the general health and its efficacy in saving the permanent teeth. In many cases, it has been necessary to follow up the prophylactic treatment with sufficient reparative work to put the mouth in a really hygienic condition in order that the best results could be obtained from the prophylaxis.

The types of service that should be offered to school children in order to obtain the best results are:

1. Prophylactic cleanings at least twice a year, and three times a year if possible, for all children in the first five grades. (Prophylactic cleaning is more important for keeping the soft tissues of the mouth in a normal,

healthy condition, than for the purpose of keeping the teeth clean. It is important to realize the benefits to the soft tissues of the mouth of regular cleaning of the teeth.)

2. Extraction of all unsavable or badly diseased teeth. (A badly diseased tooth might possibly be saved, but there may be circumstances in regard to the patient's physical condition which would make it inadvisable to attempt to save such a tooth.)
3. Prophylactic fillings to prevent decay in all first permanent molars. (In the prophylactic filling no cutting is done to the tooth. Prophylactic fillings are generally placed in a newly erupted first permanent molar, to obviate the retaining of food débris in the crevices or deep grooves.)
4. Treatment with silver nitrate to arrest decay in deciduous teeth. (There are many cases of incipient caries in deciduous teeth that can be arrested by the use of silver nitrate, without the necessity of operative procedure, It is well known that it is desirable to retain the deciduous teeth until the permanent teeth have been sufficiently formed to retain the spaces in the dental arch.)

In regard to the policy of the choice of patients, the younger children should be concentrated on if the service cannot be made large enough to care for all the children in the school. The younger children are chosen for the first work in order that special attention may be given the first permanent molars. Their importance cannot be overemphasized because the majority of parents still think they are temporary teeth.

HEALTH CENTERS, SETTLEMENT HOUSES AND CHURCHES

The purpose of the health center is to keep the community well. Their work, therefore, is preventive. The bulk of the preventive job is instruction. In order to establish their clientele, for the purpose of instruction, it has been necessary to maintain clinics for minor ills, as neither lay people nor professional people are entirely accustomed to the preventive idea, though understanding of its importance is rapidly spreading. There are still many people who go to the doctor or dentist only when they have some ailment to be cared for. There are also some professional people who are still not interested in seeing their clients unless there is some definite ill to be treated.

Settlement houses are established primarily with the purpose of carrying out educational experimentation as well as providing recreation. For years, it has been the rule of the settlement houses to demonstrate new ideas until they are accepted by the public and sufficient demand is made so that the proper authorities of a permanent nature take up these ideas and carry them out. During the time before interest is established, settlement houses work on problems of education, health, welfare, and recreation, and develop methods and technic. In this way, many ideas of permanent value to the community have been demonstrated, and later adopted, but from a professional point of view the weakness in this system is that these activities usually lack proper professional supervision. The task of the settlement house, like that of the health center, should be to further preventive dentistry in the community.

Churches that have provided dental service have usually done so because some worker in their group has been particularly interested in health. The type of clinic established in this way is much the same as the clinic in the settlement house, and it also, because of its detached nature, usually lacks professional supervision. The types of service to be rendered in these institutions should be the same as those offered

in the public schools, because their work is primarily of an educational nature. Their policy regarding choice of patients, therefore, should be the same. The field of preschool and prenatal work has been little touched on, and to this field health centers and settlement houses have better access than any other organizations, up to the present. Since the rôle of the settlement house has been one of a pioneer in the fields where other organizations have not had the time or money to venture because their methods and technic had not been developed, it is suggested that special effort along these lines be made by such institutions.

PROFESSIONAL SUPERVISION

The committee wishes to emphasize the great importance of professional supervision, particularly when any attempt is made to develop method and technic as was just suggested. By supervision, the committee does not mean occasional fault-finding inspections or the establishment of a board supervisory in name only. Professional supervision is the regular contact of a consultant or supervising dentist or body of dentists with the dentists who are performing the actual work in the clinics. Professional supervision consists in assuming responsibility for the quality of the work turned out and in availability for consultation; but, more than that, it means a constructive interest in the work, which develops a stimulating morale. Work supervised in this way not only maintains its permanency but also builds for future development. In dental colleges and hospitals, this supervisory service is automatically provided, but for detached dental clinics it has never been adequately developed.

The committee considers supervision of so much importance to the efficiency of work done and to the morale of the clinic that it advocates the abolition of detached pieces of work unless supervision is provided.

ORGANIZATION

As with dental policy, dental organization in hospitals and clinics is unstandardized. This is largely due to the fact that dental services have only recently been introduced into that old established organization, the hospital. A new professional group, the dental, has had to fit in with the medical, nursing, administrative and other bodies, which have largely made up the hospital organization. The relations of the medical and dental professions have been the subject of much discussion of late years owing to advances in both, and the organization of dental services within the hospital or clinic must, of necessity, depend largely on the interrelations of medicine and dentistry. In studying the kind of organization best suited to carry out the policies as stated, it was found that there were many methods employed in carrying out a dental service. The following examples will give an idea of the variety to be found in New York City hospitals alone.

In Hospital No. 1, there is on the medical staff a consultant oral surgeon and an assistant dental surgeon. The chief of the dental clinic in the outpatient department is the assistant dental surgeon of the hospital dental staff. He has three assistants in the outpatient department. No member of the dental staff is on the medical board. In this hospital, the only type of service offered is oral surgery.

In Hospital No. 2, there is a group of medical officers. This group corresponds to the hospital staff in other hospitals. There is one man, with the title dental and oral surgeon, who has two assistant dental surgeons. The two latter conduct the clinic in the outpatient department. There is no apparent connection with the medical board.

The types of service offered are extractions, fillings, cleanings and oral surgery.

In Hospital No. 3, there is no dentist or oral surgeon on the hospital or medical board. There is a dental clinic in the outpatient department, which is given over to an outside dentist. He has equipped the clinic. He brings his own assistants and runs the clinic as an independent department. This scheme has been resorted to because the hospital authorities claim to be unable to afford a dental clinic under any other circumstances. The services offered are cleanings, extractions and roentgen-ray examinations. No provision is made for service for the ward cases, but it would be rendered if a physician asked for such service for one of his patients.

Hospital No. 4 has a lay board, with a dental committee composed of two members. The chairman is a member of the executive committee. The other member is one of the trustees. The medical board has a number of standing committees, of which the dental committee is one. Of its three members, only one is a dentist. The two others, one of whom is the chairman, are physicians and members of the medical board. The dentist, and his eight assistants, are members of the medical and surgical staff of the hospital. Up to the present, the outpatient department has no dental service. The types of service rendered to ward patients are oral surgery, plate work, fillings and some cleanings.

In Hospital No. 5, there is a dental board, independent of the medical board, which reports directly to the board of managers, just as the medical board does. It was organized a few years ago, with seven members. This board deals with all questions of dental and oral surgery. During the year, each member of the board conducts one clinic, to which all members of the hospital and outpatient staffs are invited. Their idea is to promote the interest of medical men in the dental service and the dental in the medical service. The hospital has two dental interns. All types of dental services are rendered, except orthodontia.

In Hospital No. 6, there is an operative dentistry service and one for oral surgery. The chief of the operative dentistry service is a member of the medical board of the hospital. There are regular meetings of the members of this service for clinic purposes and for discussion of policy and needs. The types of service they offer are cleaning, filling, when there is no root canal involvement, and oral surgery.

Questionnaires were sent to 385 hospitals outside New York having more than 100 beds. Replies were received from 47 per cent of the institutions. The answers on the questionnaires showed that the same conditions apparently prevailed outside New York as within the city. They indicate a chaotic state of organization, which appears to be largely due to lack of a definite policy.

There is evidently an increasing demand for dental service, since the replies to these questionnaires sent out in 1924 show an increase in the number of dental clinics over those reported in a similar study made in 1921. Of 144 hospitals in 1921, there were eighty-nine that had dental service and fifty-five that had none. In 1924, of 182 hospitals, there were 135 with dental service and forty-seven with none. The increase in the number of clinics is 12 per cent, and, in addition, ten places reporting no dental service, at the time, were planning to install the service in the near future.

The types of organization reported ranged from the institution with a consultant on the staff who was called when necessary, to a well-organized service with a definite policy that served as a matter of routine every ward patient and all outpatient department clients referred from the other clinics.

The committee, having studied the different types of organization, recommend the following as practicable:

1. A definite policy should be adopted before instituting dental service, regardless of the size of the institution.

2. Dental service is regarded as an essential part of the work of a general hospital and should be organized as one

of the professional departments of the hospital.

3. The dental service should be under the direction of a chief, who should rank with the chief or chiefs of other professional departments or services of the hospital, such as medicine or surgery.

4. The dental service should be represented on the general medical board of the hospital, in a manner conformable to that in which other major services of the hospital, such as medicine and surgery, are represented thereon. The general medical board is understood to be a body that should have supervision over the general professional policies and standards of the institution.

5. The dental policies and standards for the hospital should be under the professional control of the dental service, subject to final decision of the medical board.

6. The dental staffs of the hospital and its outpatient department should constitute one organization. The chief of the dental service should have direct supervision over the outpatient department.

7. Regular staff conferences of the dental service should be held for the discussion of ward and clinic cases, and dental staff members should participate in the general clinics or conferences.

8. The dental service should participate in the consultation facilities that are maintained among the various services of the institution. Professional responsibility for each patient should at any given time devolve on one service, those services to which the patient may be referred for consultation reporting to the service which has assumed responsibility.

9. The appointment of dental interns is desirable. They should be assigned definite duties in the hospital and the outpatient department under the supervision of the visiting staff of the dental service.

10. Surface cleanings, which are so important in maintaining a healthy condition in the mouth, should be done by oral hygienists working under the supervision of the dental staff.

11. A small institution which limits its dental work to a consultation service only should have the consultants attend at regular intervals instead of when called. It is desirable that such institutions should employ a hygienist to do surface cleanings, and to chart mouths. The appointment of a dental intern would also be advantageous, if financially practicable.

ORGANIZATION IN CLINICS UNATTACHED TO HOSPITALS

The committee found that apparently no attempt had been made to solve the question of organization in the detached clinics. In the schools, the clinics are run by the board of health, with a special department for the management of the dental work, but in the health centers, settlement houses, etc., the organization, although apparently sound in theory, makes no provision for practical supervision. The question of the kind of supervision necessary and a method of administering it has not been worked out. For that reason, the committee is not prepared to make a statement until further study is made of the problem.

ORAL SURGERY

The question of oral surgery and its place in the hospital organization was taken up by a special subcommittee. It had seemed, at first, that the real problem was the position that should be held by oral surgery in an institutional program. It soon became apparent that the real problem was the lack of under-

standing of the term oral surgery. Dental surgery has to do with the teeth and their investing tissues. Oral surgery was defined as maxillofacial surgery. Maxillofacial surgery was a development of war time, and since the cases of industrial wounds simulating gun shot wounds are comparatively few now, it would probably be more understandable to state that oral surgery is that branch of surgery that deals with the study and treatment of diseases and malformation of the mouth, jaws, associated structures and tissues. Because of the rapid development of dentistry, and especially of mouth surgery, there is a constant shifting of standards and qualifications. To insure oral surgical patients the safest procedure and to leave the field operated on in the most favorable condition for future dental restorations, a special training is necessary. This training needs for its foundation knowledge of dentistry and a sound surgical technic.

The committee recommended that (1) major oral surgery be under the supervision of the director of the general surgical service, except in a teaching institution, where it should be a separate service; (2) each institution have a separate dental department or service in which all problems of dental surgery are handled; (3) oral surgery be taught in both medical and dental colleges.

The committee feels that it is of supreme advantage for the oral surgeon to have both the dental and the medical degree. It recognizes, however, the disadvantage from an economic point of view of preparing to engage in this specialty and feels that some advantageous changes might be made in the curriculums of the dental and medical colleges to make this type of work more readily available for young men who have a special aptitude for it.

RECORDS

In making the recent survey of the dental clinics of Greater New York, it was found that there were almost as many different kinds of forms for recording dental operations as there were clinics. One clinic used no record form. Dental records in general are found to be poorly developed and unstandardized.

Confusion arises because of different systems employed to identify teeth. No less than five such systems have been noted in different clinics; namely; numbering the teeth 1 to 8, beginning with the central incisor and using the symbols (⌊ ⌋ ⌈ ⌉ to indicate whether the numbered tooth is upper or lower, right or left; numbering upper teeth 1 to 8, and lower teeth 9 to 16, beginning with the central incisor and writing left or right as the case may be; numbering 1 to 32 beginning with the last molar upper right and ending with the last molar lower left; number 1 to 32 beginning with the last molar upper right and ending with the last molar lower right; with pictures of the teeth.

There were two different systems employed to indicate the surface of the tooth treated; namely, a circle divided into four segments to represent the four sides of the tooth, with an inner concentric circle to represent the occlusal surface, and pictures of the occlusal surfaces.

On some of the records, considerable space was used up for a "key to records." This "key" was not the same on any two records. The abbreviations were easily confused, especially on account of the uncertainty of handwriting. In

most cases, the "key" was ignored by the operator.

On account of the varying conditions in different institutions, the committee thinks that no uniform size for a record can be determined. In order to have the information that is essential for the best treatment of the patient, this subcommittee makes the following recommendations:

1. That the size of the record be determined by the filing system in use in each institution.
2. That the face of the record contain:
   (a) whatever social service history is required by the institution
   (b) case history, i.e.:
      (1) previous illness
      (2) previous operations including hemophilia and reaction to anesthesia
      (3) previous injuries
   (c) examination record with chart
3. That the reverse side of the record contain:
   (a) record of operations with a small chart like the examination chart to indicate the surface of the tooth treated
   (b) debit and credit columns
4. That the form used on the charts to indicate a tooth be the circle divided in four segments to represent the four sides of the tooth with an inner concentric circle to represent the occlusal surface.
5. That the standard dental symbols familiar to all dentists, anthropologists, anatomists, paleontologists, histologists, etc., be adopted. The permanent teeth should be numbered 1 to 8 and the deciduous teeth should be lettered A to E, beginning in each case with the central incisor. The symbols (⌊ ⌋ ⌈ ⌉) should be used to indicate the position, whether it is upper or lower, rig' or left. Also that the symbol (X) be retained to indicate an extracted tooth.
6. That abbreviations, Greek letters, etc., be abolished and that operations performed be written out unless column headings are provided so that treatments can be checked.
7. That the "key to the record" be abolished.
8. Statistics of the number of patients, number of operations performed, visits of patients, etc., are poorly kept in many dental clinics. The terms used are often not comparable and the methods of collecting and tabulating the figures are frequently both laborious and inaccurate. It is, therefore, strongly recommended that a competent statistician devise a system for tabulating monthly and yearly reports.

EQUIPMENT

The subcommittee, realizing that the equipment and lighting of a dental clinic are of the utmost importance in giving proper care to patients, makes the following recommendations for clinics in hospitals and their outpatient departments; also for detached dispensaries:

1. That the chairs be easily adjustable and comfortable for both patient and operator and that they be constantly kept in good working order.
2. That a clinic doing work primarily for children have a child's chair.
3. That a good lighting system be provided.
4. That no elaborate or unnecessary fixtures be used but only things that can be readily cleaned.
5. That sterilization by boiling water be used; also that an extra sterilizer be kept on hand for emergencies.
6. That hot and cold water be available in the clinic room.
7. That a wash basin with foot or knee controls, rather than hand faucets, be used.
8. That an easily cleaned floor covering, preferably linoleum be used. Tile floors are impracticable because of breakage of instruments which are dropped.
9. That a roentgen-ray machine be available for the use of the dental clinic but preferably that there be a portable roentgen-ray unit for dental use only.

10. That standard instruments suitable and sufficient for the operation of the clinic be provided.
11. That each clinic have an attendant responsible for sterilization, cleanliness and any assistance the doctors may need.
12. That, in case the clinic does its own laboratory work, a room with standard laboratory equipment be provided apart from the operating room.
13. That a portable electric dental engine be provided for clinics having more than one chair, instead of having wall electric engines for each unit, especially if only one chair is used at a time for fillings.
14. That the services of a pathologic laboratory be available to the dental clinic.

For the other types of clinics outlined by the subcommittee on policy, certain modifications may be made; e.g., cases involving roentgen-ray examination should be handled in a medical center. Patients needing plate or bridgework should be referred to private dentists, the dental colleges or hospitals providing that service. Consequently, a health center, settlement house or school can set up a dental clinic by providing a space 7 by 9 feet in front of a window for each chair, and by having running water and a gas or electric attachment where a sterilizer can be connected.

In places where prophylactic treatment only is to be given as, for example, schools and settlement houses where dental hygienists may work, a room with windows along one side, having running water and connection for a sterilizer, is sufficient. Portable chairs and brackets may be set up facing the windows. Sputum cups may be used instead of sanitary cuspidors with running water. With this simple equipment, which can be moved from one institution to another wherever space is available, large numbers of children can be given surface cleanings and be referred to permanent dental centers for any necessary reparative work.

CONCLUSIONS

The Dental Advisory Committee and its subcommittees feel that the problems with which they have been confronted are far from solved. The recommendations and standards herein presented are regarded as tentative, and it is hoped that many individual institutions and health organizations interested in dental service will contribute to their improvement in the future as well as to the practical adoption of important standards of dental service in this city and elsewhere.

A number of problems that might have been taken up by our committee have been disregarded because of lack of time. Among these are the dental problem of the welfare agency, the question of adequate professional supervision for detached dental clinics and the dental policy that should be pursued by industrial concerns.

There are two family welfare agencies in Greater New York that are supplying dental service. Many similar agencies are demanding dental service for their clients but have made no provision of their own. In this report, no policy has been stated for the family welfare agencies because there is as yet no agreement among them as to how much responsibility they must assume for the dental needs of their clients. In some cases, efforts are being made along general health lines, but no attention is being paid to mouth hygiene. Other agencies have assumed that dependent people are unadapted to life, either temporarily or permanently, and must therefore be treated as wards, and they are provided with all the dental

service necessary to put the mouth in a hygienic condition.

The family welfare agencies have been told repeatedly that they should use the medical centers, but in many cases the medical centers are not in a position to care for the relief agencies' clients because they are so busy taking care of their own bed patients and patients referred from other clinics of the outpatient department. Besides, many relief agencies' cases are in need of restorative work, such as plates and bridges, which could not possibly be supplied by a medical center unless it had an enormous amount of space, and equipment and a very large personnel.

The committee suggests that the question of dental service for welfare agencies be taken up by another committee appointed to study the subject.

The question of professional supervision for detached dental clinics has been discussed. It is so vital a factor that some attempt to solve the problem should be made to insure the permanency of these clinics and the quality of their work.

It has never been determined whether it is the province of an industrial concern to provide dental service for its employes. The establishments that have entered the field are doing varying types of work. Some allow a dentist space in which to do dental work at a nominal fee for the employes. The opportunity of having work done is embraced only by those who appreciate its cosmetic value and by those who are actually suffering.

In some business concerns, the employes are given prophylactic treatment and roentgen-ray service and are referred to private dentists for necessary reparative and restorative work.

A valuable contribution to industrial medicine could be made by studying this problem.

The committee welcomes the organization of a committee on community dental service for New York City, which is in process of formation under the auspices of the New York Tuberculosis and Health Association. It is gratifying to feel that a representative body of this type will be formed to pursue a broad program for dental service in the metropolis.

CINCINNATI DENTAL SURVEY

The Mouth Hygiene Section of the Public Health Federation of Cincinnati is making a dental survey of the city in order that it may propose to the proper authorities a plan for an adequate dental program.

The following statistics show graphically the dental situation in Maine:

Population	791,479
Communities	520
Communities without a dentist	407
Communities with dentists	428

	1905	1915	1925
Population	718,378	755,151	791,479
Dentists	343	393	428

Communities having dentists

1905	1915	1925
119	118	113

RADIO TALK

The United States Public Health Service has recently released a radio talk on "Halitosis," which may be broadcast by giving proper credit. Copies may be obtained through the Department of Dental Health Education, American Dental Association, 58 E. Washington Street, Chicago.

DENTAL COURSE

The teachers taking a summer course at Bates College Summer School, Maine, were given a short course on dental hygiene by Miss Dorothy Bryant, Director, Division of Dental Hygiene, Maine State Department of Health.

THE DENTAL HYGIENE COUNCIL
ENDORSES THESE FUNDAMENTALS, AND ADOPTS THE RESOLVE
EARLY TREATMENT
PRENATAL REQUIREMENTS
FUNDAMENTALS OF PUBLIC HEALTH DENTISTRY
Early Treatment.
Rest.
Sunshine.
Home Care.
Fresh Air.
Prenatal Care.
Proper Food.
PROPER FOOD
HOME CARE
A GOOD BREAKFAST

MEMPHIS DENTAL SOCIETY

The dental society of Memphis, Tenn., is compiling a group of bulletins, one of which can be included in the monthly statement sent by the dentist in private practice. The first two bulletins will give an idea of the type and tone of the information given:

BULLETIN NO. 1

An important fact to keep constantly in mind is that dentistry is a distinct health service depending upon three definite factors for success:

FIRST—Systemic health, or physical resistance, is essential to all immunity to and recovery from disease.

SECOND—Cooperation of the patient in permitting proper service, keeping mouth tissues in hygienic condition and obeying fundamental health laws.

THIRD—Character of dental service rendered.

It is true, then, that dentistry can neither assume, nor rightfully be assigned, the sole responsibility of either prevention or cure of disease. The obligation is mutual between patient and dentist and if either is negligent in the performance of duty the penalty is written in terms of failure.

BULLETIN NO. 2

The primary purpose of dentistry is to promote health through the prevention and correction of disease. This is impossible unless the digestive and assimilating organs are kept in normal balance, or functional harmony.

Since the mouth and all other organs of the body depend upon each other the scope of dentistry cannot be confined to the mouth, but must take into account the entire digestive system, of which it is the barometer.

The first of a series of food changes, necessary to proper digestion, occurs in the mouth. When these changes are properly understood, foods will be eaten because they are needed and not because they are liked.

A well-balanced meal should contain 10% protein, 30% fat, 60% carbohydrates. This may be changed to meet personal needs.

TAKE THE DIE OUT OF DIET

ADDITIONS TO THE BOOK SHELF

"Care of the Mouth and Teeth," by Joseph H. Kauffmann, D.D.S.; published by the Allied Book Co., 500 Fifth Ave., New York City.

"Personal and Community Health," by Clair E. Turner; published by C. V. Mosby Co., St. Louis, Mo.

"Preventive Dentistry," by Alfred C. Fones, D.D.S.; published by Lea & Febiger, New York City.

"The Normal Diet," by W. D. Sansum, M.S., and M.D.; published by C. V. Mosby Co., St. Louis, Mo.

FIELD NOTES*

The University of Tennessee College of Dentistry established a two-year course for dental hygienists in September, 1925. For the first year, the class is limited to six members. The course will continue through two scholastic years of thirty-two weeks each. This is the eleventh course in this country for the training of dental hygienists.

The Division of Dental Hygiene of the Maine State Department of Health held exhibits at all of the fairs throughout the state.

The Kansas Health Committee is conducting an intensive health campaign this Fall, laying special emphasis on dental health.

Louisville, Ky., claims to have the oldest dental office in the world. Grandfather and father have practiced and the grandson is now practicing in the office, which is 90 years old.

*The Department of Dental Health Education will be glad to receive items of news along the lines of education in dental or general health.

The Journal of the American Dental Association

58 East Washington Street, Chicago, Illinois.

Please send in promptly notice of change of address, giving both old and new. Important information regarding subscription price, etc., will be found in the advertising pages.

Editorial

THE LOUISVILLE MEETING

Each succeeding annual meeting of the American Dental Association stands out with some distinct achievement to mark a milestone on the road to advancement, and the Louisville meeting was no exception. At its close, there were many expressions on the part of those who have been longest identified with its management and most active in promoting its welfare, to the effect that in certain definite respects it was one of the most satisfactory meetings ever held. In the calm deliberation of the House of Delegates and the Board of Trustees, many matters were clarified and settled which for some time had been hanging over the Association with much uncertainty.

The first general movement in this direction was the adoption by the House of Delegates of the amendment proposed by Dr. Burkhart at the Dallas meeting whereby the annual dues should be four dollars and should be paid into the treasury of the Association, and dispensed to the various committees, commissions and activities of the body on the budget system; the budgets to be submitted to the Board of Trustees for their study and approval, and by them referred to the House of Delegates for final action. This settled a much mooted question, and gave the Association a working basis which everyone could understand for carrying on the affairs of the organization.

In the interval since the adoption of the Constitutional and Administrative By-Laws, many discrepancies between the two had crept in, which led to much confusion. Near the close of the meeting, Dr. Dewey of New York brought in a series of amend-

ments calculated to harmonize the two documents and provide a better working basis for conducting the affairs of the Association. After lying over for one session, according to the rules, they were in all their essential features adopted by the House of Delegates at its final session. It is felt that hereafter the machinery of the organization will function in a more regular and effective manner, and that much misunderstanding will be eliminated. Future administrations may therefore devote their best efforts toward developing the scientific and clinical activities of the Association, rather than spending so much time and energy in trying to harmonize administrative discrepancies. It is felt that this is a distinct achievement of the 1925 meeting.

The chairmen of the various sections and the heads of the clinic committee all conducted their affairs in a manner worthy of the highest commendation, and much real advance was made in the scientific thought of the Association. The general meetings were well attended, and the spirit of the speakers seemed to carry its message to the large audiences. Some of these sessions were quite notable.

The Local Committee on Arrangements had from the day of their appointment shown an energy and a capability for work which had demonstrated their fitness for preparing the stage for a great meeting. They seemed to anticipate the wants of everyone, and if there was the slightest thing overlooked, it did not come to the attention of the officers. When the sacrifice of time and the display of energy are taken into consideration, it will be apparent that the contribution of the members of the Local Committee to the welfare of the Association is no small matter, and they are entitled to the thanks of the entire organization.

The exhibits were among the most varied and extensive ever shown, and to the men coming from regions not easily accessible to dental depots, this feature proved very attractive and satisfactory.

Speaking of exhibits, it may be well to note that the Dental Health Exhibit put on by the Association was the greatest of its kind ever shown. The interest in this exhibit never flagged, and

the attendance was most gratifying. Close count was kept of the number of visitors to this exhibit, and the sum total was 10,893. This tells a very vivid story of the interest shown. While of course some of this number were probably repeaters, this fact in itself has a very encouraging aspect, proving the attractiveness of the exhibit in inducing visitors to return the second and third time. Everyone connected in any way with this exhibt should be congratulated.

The report of progress of the Committee on Organization of the Seventh International Dental Congress, which is to be held next year in Philadelphia, was most gratifying, and the promise at this time for one of the greatest dental meetings ever held is very bright. The profession will be kept informed from time to time on all developments in this connection.

Dr. Sheppard W. Foster of Atlanta, Ga., the President-Elect, was installed in office as President at the final session of the House of Delegates, and Dr. John F. Biddle of Pittsburgh, Pa., was made President-Elect for the ensuing year. Our present efficient General Secretary and Treasurer were both reelected. With a list of officers such as these, the Association should function for the coming year in a very constructive and progressive manner, and for these officers we bespeak the hearty support of every member.

One of the outstanding features of the 1925 meeting was the never-ceasing faithfulness displayed by the Board of Trustees and the House of Delegates in the performance of their various functions. These men sat for session after session without the slightest opportunity to attend the section meetings or clinics, devoting themselves unselfishly to the business routine of the organization, and showing an earnestness of purpose which is not always apparent to the rank and file of the membership. Their constructive work at this meeting was most notable.

Another fortunate circumstance at Louisville to which reference might be made with some pride was the unusually cordial sentiment developed between the citizens of Louisville and the visiting dentists. From the bell boys in the hotels up to the high-

est city officials, there seemed to be a determination to see that the dentists were made to feel at home, and this sent the members of our Association back to their various states with a very warm place in their hearts for this delightful Southern city. And on our part, it may not be immodest to refer to the fact that the people of Louisville reciprocated this friendly feeling in a marked degree by repeated expressions of spontaneous appreciation of the character and gentlemanly bearing of the attending members. This came particularly from the managers of the hotels, who went out of their way to compliment the visitors. As the manager of one hotel wrote subsequently "From a hotel standpoint, it was one of the most successful conventions which we ever handled." It is a real asset to dentistry and to the Association to leave this kind of impression wherever a meeting is held, and it is incumbent on our members to see that the reputation gained at our recent annual sessions is maintained on all subsequent occasions. It will raise the status of the dental profession in the eyes of the world, and bring to us a larger measure of self-respect.

THE JOURNAL

The duties and responsibilities of the General Secretary's office have become so exacting, and the details so great, that the Board of Trustees at Louisville decided to relieve the situation by instituting a division of service. The business management of the magazine has been placed in the hands of Dr. King, on a five year contract, and the editorial department is to be conducted by Dr. Johnson. A board of censors, appointed by the Trustees, is to pass finally on all material going into THE JOURNAL, whether reading matter or advertisements, and the business manager and editor are to be in the closest conference on everything pertaining to the welfare of the magazine. It is confidently felt that by this arrangement the greatest efficiency will result, and the best interests of the Association be conserved.

OTTO U. KING, *Business Manager.*
C. N. JOHNSON, *Editor.*

Fédération Dentaire Internationale, Geneva, Switzerland, August 2-6, 1925.

Medical and Dental News

Illinois

Class in Public Speaking: The Public Service Committee of the Chicago Dental Society is conducting a class in public speaking for twenty-five members of the society, who are being trained to go out as minute men to speak on preventive dentistry. Professor Nelson of Chicago University is in charge of the course, meeting with the class one evening each week.

Examination of Children of Preschool Age: The Illinois State Medical Society has joined with the Illinois Federation of Women's Clubs in a campaign to advocate the examination of children of preschool age. The Lay Education Committee of the Illinois State Medical Society has invited the Illinois State Dental Society to cooperate in this movement and has requested that a list of members of the Illinois State Dental Society be furnished to the Lay Education Committee. This announcement appears at this time in order that the members may understand what has been done. Later on, children of preschool age will probably be referred to them for an examination. It is expected that the customary fee will be charged for this examination.—*Bull. Illinois Dent. Soc.*, September, 1925.

Debate on Removal of Infected Teeth: Under the auspices of the Odontographic Society of Chicago, and before an assembly of their members, other Chicago dentists and physicians and many members of the dental profession from all parts of the country and from Canada, a debate was presented, October 12, at the Hotel LaSalle, Chicago, on the subject "Resolved, that Practically All Infected Teeth Should be Removed." Dr. Weston A. Price, of Cleveland, took the affirmative; Dr. John P. Buckley, of Hollywood, Calif., the negative. Dr. C. N. Johnson of Chicago, presided. A banquet preceded the debate.

New Medical Research Plan: The trustees of the University of Chicago have approved a new program of the Rush Medical College, which will enable students and physicians already practicing to carry on research work. The virtual completion of the Rawson Laboratory of Medicine and Surgery will expedite the early inauguration of the program. It is proposed to offer opportunity for study and investigation by graduate physicians who are willing to spend from one to three years in preparing themselves either for practice or teaching or to continue investigation, or combinations of these.

Kentucky

Mountain Dental Clinic: The clinic maintained by the Dental School of the University of Pittsburgh at Pine Mountain, Ky., was conducted, August 19-28, 1925. Pine Mountain School has an enrollment of 100. Drs. McMonigle, Black and Walker, all of Pittsburgh, were in charge of the clinic. The work done was as follows: number of patients, 188; prophylactic treatments, 188; amalgam fillings, 162; silicate fillings, 94; extractions, 229.

Annual Shoot of Trapshooters' League: The National Dental Trapshooters' League held their annual shoot at Louisville, Ky., Sept. 21, 1925, at the Louisville Gun Club. The championship cup was won by Dr. P. R. Hollingsworth of St. Louis, Mo., after a shoot off with Dr. W. H. Conklin of New York City, who tied Dr. Hollingsworth at the high score of 95 hits out of a possible 100. Dr. Conklin won the runner-up cup, Dr. J. M. McMinn of Dallas, Texas, won third prize, Dr. T. R. Crovatt, Thomasville, Ga., fourth, and C. W. Mills, Chillicothe,

Ohio, fifth. P. R. Hollingsworth was elected president for the coming year, with Mr. McMinn, vice president and G. C. Smith, St. Louis, Mo., secretary (reelected).

MASSACHUSETTS

Death of Dr. E. R. Kelley: Dr. E. R. Kelley, state commissioner of public health since 1918, and a nationally known public health worker, committed suicide recently as a result of overwork. Dr. Kelley, who was 43 years of age, had, since his graduation from Johns Hopkins Medical School, in 1906, held many positions of responsibility on various health commissions. He was also the originator of campaigns against tuberculosis and other communicable diseases in the state.

MISSOURI

Dentists on Public Health Association Program: At the annual meeting of the American Public Health Association, in St. Louis, Mo., October 19-22, Harold DeWitt Cross of Boston, Mass., spoke on "The Possibilities of Dental Hygiene," and Thomas C. McCrum of Kansas City, Mo., spoke on "Dental Examinations of School Children."

FOREIGN

Resolutions of Congress of Radiology: The first International Congress of Radiology, which met in London in July, elected at the close of the congress Dr. Gosta Forsell, Stockholm, president, and passed resolutions that the next congress be held in Stockholm in 1928, and that further international congresses shall be held at intervals of three years; that any country having a radiologic society or societies shall be entitled to send not more than five official delegates to each congress, but that each country shall exercise only one vote, and that the country in which any congress is held shall be entirely responsible for all the arrangements of the congress, financial and otherwise, and that a sum of money not exceeding £20 shall be allotted to the secretary of delegates from the funds of each congress meeting to cover his expenses.—*J.A.M.A.*, Sept. 19, 1925.

GENERAL

Archæological Tooth Successfully Repaired: The priceless 200,000 year-old tooth of the Hesperopithecus, more popularly known as the ape of the west, which was accidentally broken while an X-ray photograph was being taken at the Natural History Museum, New York, has been successfully repaired. This is the only tooth of the Nebraskan ape-man in existence and is an important link in tracing the ancestry of man. Before the fossil was found in a Nebraska gravel pit, no trace of the great anthropoid apes had ever been found in America.

Platinum Reef: A platinum reef, in some places about 70 feet wide, has been traced for nine to ten miles in the northern section of the Lydenburg fields, (South Africa), near the Olifants river. Surface values are two to three pennyweights of platinum per ton.

Officers of the Federation of American Women Dentists: The Federation of American Women Dentists, at Louisville, elected the following officers for the ensuing year: president, Josephine D. Pfeifer, Chicago, Ill.; vice-president, Minnie M. Proctor, Los Angeles, Calif.; secretary-treasurer, Mildred Dickerson, Washington, D. C.; vice regents, Lelia M. Taylor, Boston, Mass.; Agnes Polhamus, New York City; Anna E. Famieson, Pittsburgh, Pa.; Mabel Bennett Younger, Cleveland, Ohio; Florence Lilly, Chicago, Ill.; Alice Hunter, Des Moines, Iowa, and Wagner Easton, San Francisco, Calif.

ARMY

Army Dental Corps: Captain William B. Caldwell from duties at Fort Moultrie, S. C., to New York City and about Jan. 21 to San Juan, P. R., for duty.

Capt. Albert L. Alexander from duties at San Juan, P. R., to duty at Fort Moultrie, S. C.

Capt. George R. Kennebeck, on duty in office of surgeon general, Washington, will report Nov. 13 for duty in general dispensary, Washington, in addition to his other duties.—*Army and Navy Register*, Oct. 3, 1925.

The appointment of 1st Lieut. Mackey J. Real, dental reserve, on duty at Walter Reed General Hospital, Washington, as first lieutenant in the dental corps, Regular Army, with rank from September 10, is announced.—*Army and Navy Register*, Sept. 26, 1925.

A. D. A. Membership Among Army Dental Corps Officers: Although scattered widely throughout the United States and with members residing in the Philippines, Hawaiian

Islands and the Panama Canal Zone, 149 of the 156 dental officers in the Army are members of the American Dental Association.

Navy

Dentistry in Naval Recruiting: The importance of giving careful consideration to the dental condition of all applicants for enlistment in the Navy and Marine Corps is made the subject of a special letter to all officers of the naval medical corps. With the limited dental officer personnel available, it has been impossible to assign to duty at naval training stations and marine recruit depots a sufficient number of dental officers to render recruits dentally fit before their transfer to vessels of the fleet. In consequence, the demand for emergency treatment on board ship prohibits the accomplishment of the required amount of reparative dental treatment. The surgeon general of the Navy says:

The boards of review at several of the naval training stations have recommended a considerable number of recruits for discharge from the service on account of dental defects. Despite this fact, it is believed that many men who have chronic dental infections pass through the training station without dental treatment and that usually only men who are found to have such gross defects as the loss of many teeth are referred for examination by the boards of review. In addition, the bureau of medicine and surgery receives many requests for prosthetic dental treatment in the cases of men who have had very little naval service. In the majority of these cases the patients have required hospitalization for treatment of the dental disease or deficiency or for treatment of conditions which have appeared to be sequelae of dental infections. The bureau does not consider that all medical officers need become expert in dental diagnosis, but it is believed that every medical officer on recruiting duty should endeavor not only to note the loss of a sufficient number of teeth to constitute a disqualifying defect, but also to detect pathological conditions of the teeth and their surrounding structures which would make the applicant for enlistment a poor physical risk.—*Army and Navy Register,* Sept. 26, 1925.

Naval Dental Corps: The following changes in stations and duties of officers of the naval dental corps will be effected: Lieutenant Commander Lucian C. Williams from bureau of medicine and surgery, Navy Department, to the U. S. S. Pittsburgh; Lieutenant Adolphus R. Gleitsman from naval training station, Great Lakes, Ill., to the U. S. S. Melville; Lieutenant David L. Cohen from the U. S. S. Maryland to naval training station, San Diego, Calif.; Lieutenant Patrick A. McCole from the U. S. S. Arkansas to the U. S. S. Whitney; Lieutenant Walter S. Minowitz from navy yard, Mare Island, Calif., to naval air station, San Diego, Calif.; Lieutenant Paul W. Yeisley from navy yard, New York, to naval training station, Newport, R. I.; Lieutenant Frederick W. Mitchell from naval training station, San Diego, Calif., to the U. S. S. Maryland, and Lieutenant Hubert F. Delmore from the U. S. S. Melville to naval training station, Hampton Roads, Va.—*Army and Navy Register,* Sept., 19, 1925.

Books Received

The American Illustrated Medical Dictionary: A New and Complete Dictionary of the Terms Used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Nursing, Veterinary Science, Biology, Medical Biography, etc., with Pronunciation, Derivation and Definition, Including Much Collateral Information of an Encyclopedic Character. By W. A. Newman Dorland, A.M., M.D., F.A.C.S., Lieut-Colonel, M.R.C., U. S. Army, Member of the Committee on Nomenclature and Classification of Diseases of the American Medical Association; Editor of "American Pocket Medical Dictionary." Ed. 13, Revised and Enlarged. Philadelphia and London: W. B. Saunders Company, 1925. With new and elaborate tables of arteries, muscles, nerves, veins, etc.; of bacilli, bacteria, diplococci, micrococci, streptococci, weights and measures, posologic tables, eponymic tables of diseases, operations, signs and symptoms, stains, tests, methods of treatment, etc. Of special interest to dentists is the statement in the preface that the terminology of dentistry has been given special care, several hundred new dental terms having been added.

Personal and Community Health: By Clair Elsmere Turner, Associate Professor of Biology and Public Health in the Massachusetts Institute of Technology; Associate Professor of Hygiene in the Tufts College Medical and Dental Schools; Sometime Member of the Administrative Board in the School of Public Health of Harvard University and

the Massachusetts Institute of Technology; Fellow American Public Health Association; Major, Sanitary Corps, U. S. A., (Reserve). St. Louis: The C. V. Mosby Company, 1925. Illustrated; pp. 426. Price, $2.50.

According to the preface, this has been prepared for the student at the university, college or professional school. It deals with the health of the individual and with the health of the community. The treatment of personal hygiene presents the facts of healthful living and the scientific principles upon which these health practices rest. There is little discussion of anatomy and the description of body functions goes only far enough to make clear the principles of hygiene which are presented. The public health is considered from the standpoint of what the college or professional man, who is not a sanitarian, needs to know in order to protect his family and meet his responsibility as a citizen.

Pathology of the Mouth: By Frederick B. Moorehead, M.S., D.D.S., M.D., Dean and Professor and Head of the Department of Oral Surgery and Pathology, College of Dentistry, University of Illinois; Associate Professor of Surgery, Rush Medical College and University of Chicago; Oral Surgeon to Presbyterian and Children's Memorial Hospitals and to the Home for Destitute Crippled Children, Chicago, and Kaethe W. Dewey, M.D., Assistant Professor of Pathology, College of Dentistry, University of Illinois, Chicago. Philadelphia: W. B. Saunders Company, 1925. 213 illustrations; pp. 540. Price, $7.00.

According to the preface, it is hoped that this volume may call sharp attention to the magnitude of the mouth in disease, both in its local and in its general aspects, and stimulate a fundamental interest on the part of physicians and dentists, in this hitherto neglected territory, neglected because the medical school does not recognize dentistry as a part of medicine and gives the student no appreciable systematic instruction in diseases of the mouth, and because, until very recently, dentistry has devoted itself to the teeth, and the dental student has been given no training in medicine and little in pathology.

The Normal Diet: A Simple Statement of the Fundamental Principles of Diet for the Mutual Use of Physicians and Patients. By W. D. Sansum, M.S., M.D., Director of the Potter Metabolic Clinic, Department of Metabolism, Santa Barbara Cottage Hospital, Santa Barbara, Calif. St. Louis: The C. V. Mosby Company, 1925. Illustrated; pp. 72. Price, $1.50.

The following subjects are treated: the caloric requirements of the body; the protein requirements; the bulk requirements; acidosis; mineral requirements; water requirements; vitamin requirements.

Deaths

Carr, William, New York City; College of Dental and Oral Surgery of New York, 1872; president of the American Dental Association, 1907-1908; died, October 15, at Centre Morichies, N. Y.

Williams, G. R., Fort Worth, Texas; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1901; died, August 10, from injuries received in an automobile accident.

CURRENT LITERATURE

EXTRACTS AND ABSTRACTS

Malnutrition in Cleft Palate Cases: Malnutrition in the infant with cleft palate is due to partial starvation, the muscular effort required to obtain food producing fatigue, and resulting in an insufficient caloric intake. (John A. Foote, *Am. J. Dis. Child.*, September, 1925.) The infant so affected cannot produce negative pressure by closing off the pharynx, and even if the uvula and soft palate remain intact, air enters the mouth from the nose through the cleft. In an attempt to improve on internal obturators, intended to block the opening in the palate from the inside, the author, on Dr. Clyde Gearhart's advice, devised a means of preventing the ingress of air through the palate by stopping the nostrils. A strip of dental rubber dam 2 by 4 inches, with tapes attached for tying behind the head, was placed over the nostrils. The upper edge was lifted for respiration between sucking contractions. A larger fluid intake with less fatigue was the result. Better results were obtained after the lip was repaired. The device was of no value in premature infants with a weak sucking reflex or in infants old enough to resent the nasal occlusion. It is suggested that bottle feeding of concentrated food is best in these cleft palate cases as breast nursing requires from 11 to 60 times the effort demanded by bottle feeding.

Ethics of Consultation: The past decade has wrought many changes in the practice of medicine. These are due largely to specialization and the emphasis placed upon focal infection. Dentistry has been brought into this work chiefly through oral surgery and the importance of mouth infections. The attitude of the general practitioner toward the dentist has been modified since the medical journals report findings of such men as Billings, Mayo and others. Physicians frequently refer patients with the diagnosis already made, and the directions for treatment, radical though it be. Another and higher type of physician requests an examination and report by the dentist, to be considered with the other findings. The stumbling block in many cases, however, is the lack of knowledge on the part of both professions as to the conditions which must be considered. The best results are hampered by the lack of knowledge of the two professions, each in the field of the other. Medical schools pay scant attention to dental subjects and the same has been the custom with dental teaching in regard to medicine. Some knowledge of these subjects is necessary on the part of all concerned in order to get a satisfactory and intelligent diagnosis. It is incumbent upon every practitioner of dentistry to be a reader of at least one standard medical journal, and, I might add, that the same holds true of those in the medical profession as to dental literature.—S. D. Ruggles, *Dent. Summary*, September, 1925.

Anesthesia in Children: Under this topic, Charles H. Robson (*Cur. Res. Anes. & Anal.*, August, 1925) discounts the conception that in minor surgery in infants of a few days anesthesia is unnecessary because the association tracts for pain are not fully established, and stamps as a fallacy the statement that children require more of the anesthetic for narcosis. The latter belief arises from the fact that the adult sized mask is used for the child, the air passing through being reduced and the same area requiring moistening. Children whose parents give a history of convulsions often have an enlarged thymus gland, which can only be determined by roentgen-ray examination. Suspicion should be excited when a child succumbs too quickly to the anesthesia. In cases of enlarged thymus, any obstruction to the air passages from food, blood or mucus may be exceedingly dangerous. Chloroform, ether or ethyl chlorid sometimes causes acidosis in the child following anesthesia. Starvation is a predisposing factor; therefore, it is well to direct that the child be fed (gruel, without milk, or two lumps of sugar is suggested) before the oper-

ation. In harelip, it is the author's practice to maintain narcosis with ether delivered by a curved metal tube held 2 inches from the open mouth, a Gwathmey three-bottle apparatus being used. Chloroform is available if the anesthesia becomes too light. This is one of the two types of cases in which chloroform is used in the Hospital for Sick Children, Toronto, the other being in bronchoscopic work. Nitrous oxid-oxygen is used in children in general surgical cases, the indications being the same as in adults. In young children the mask is never applied to the face in a gas-tight fit so the child does not labor against the pressure valve springs. In conclusion, the author warns that great care must be taken that cyanosis does not occur, for children will not tolerate a degree of cyanosis that is permissible in adults.

Dental Radiographic Examination: It has estimated that at the age of twenty-five, 25 per cent of the human race have septic mouths; at the age of forty-five, 90 per cent have septic mouths; and at the age of fifty, 100 per cent have septic mouths. It has also been determined by examination that from 85 per cent to 95 per cent of the population of the United States, Canada and Great Britain have cavities in their teeth produced by caries. At the Mayo Clinic examinations of the patients disclose 87 per cent have infected teeth, and 80 per cent have pyorrhea. About 78 per cent of the patients at the age of twenty-six have lost a part of the jaw bone as the result of alveolar abscess. About 33.3 per cent have roots left in after the ordinary method of extraction. About 19 to 15 per cent have impacted or unerupted teeth. About 5 to 10 per cent have residual areas of infection. Without fear of successful contradiction, it may be said that there is not more than one patient in 200 in adult life for whom the X-ray would not reveal some pathological condition, which, if corrected, would not result in benefit to the patient.—Alonzo Milton Nodine, in *Med. Press*, June 24, 1925.

Radium (Mesothorium) Necrosis: An investigation of the subject of radium necrosis was suggested by Frederick L. Hoffman (*J.A.M.A.*, Sept. 26, 1925), by a number of unusual cases of necrosis among young women all of whom had at one time or another been employed at a radium plant engaged in the manufacture of luminous watch dials. Twelve cases were studied. The patients had all done precisely the same work and in precisely the same way. They all were in the habit of wetting a penciled brush with their lips, while in use, for the purpose of painting watch dials with luminous or phosphorescent substances. Apparently, radium necrosis occurs only under certain and quite exceptional conditions. It is not the fact of general exposure to radioactive substances or nearness thereto, but, apparently, the direct result of introducing such substances in minute quantities into the mouth through the insanitary habit of penciling the point of the brush with the lips. Every case investigated gave an unmistakable history of this habit, while the numerous roentgenograms clearly indicate the consequence to both the roots of the teeth and the jawbone.

The "F. D. I.": The International Dental Federation had, perforce, during the period of the war, to suspend its activities and forego its annual meetings. At the earliest possible moment, measures were taken to ensure the resumption of its active functions, and an informal meeting of the surviving members of the Executive Council was accordingly held in September, 1921, at The Hague. At that meeting provisional recommendations were adopted for nomination of officers and reconstitution of the Commissions. Arrangements were also made for an official meeting of the F. D. I. in Madrid in the following year and for the next International Dental Congress at Philadelphia in 1926. Since then the Federation has met in Madrid, Paris, Luxemburg and Geneva. This is surely sufficient evidence of its vitality. No question of its permanence can arise. The members have displayed all the old ardour and enthusiasm, especially in promoting the advance of education, the popularization of instruction in oral hygiene, the progress of odontological science, and the fostering in the profession throughout the world of a spirit of friendship, mutual regard, and cooperation in the endeavor to prevent disease, alleviate suffering, and raise to a still loftier plane the science and art of dentistry.—*Brit. Dent. J.*, Sept. 15, 1925.

Insane Fringe of the Medical Profession: The insane is here defined as a deviation from the normal. A normal in the medical profession is an average general practitioner. It is, therefore, understood that what is written applies to that serrated portion of the "circle mass" which has become frayed because of unstable and inadequate medical balance. As

in every walk of life misfits exist, so in medicine does the incongruous worm his presence into the activity of the field. Carried along by the momentum of the able, earnest and serious, he holds on to coat-tail ends, hinders normal strides by stepping on the heels of the worker, and burdens the path of advancement by the sheer weight and bulk of his presence and lack of comprehension. Too often his viewpoint is a commercial one, and the more unlikely and incredulous his thoughts—the louder and more blatantly he boasts. Sometimes he stops long enough to utter, under his breath, low guttural protests of the unfairness of things and the unjust distribution of brains, though he does not call it that. And—in between times—clothed with the authority of his musty M.D. degree, as a self-appointed committee of one, he answers the charitable (?) urge to educate the public. Always greeted by an audience composed of his own ilk—ever eager to hear of the short-comings of the scientifically trained—he tells them of the pitfalls of serums, vaccine, anti-bodies, unnecessary surgery, the limitation of medicine and the medically controlled activities of the country. In fact, he criticizes wantonly and destructively—endeavoring to discredit the advancement of progress, vainly trying to arrest development and enlightenment—denying the possible logic and truth of anything his limited, overstimulated and fatigued mind cannot grasp—as impossible, illogical and unworthy—thinking always to keep the rest of the world as ignorant as himself—by this pseudo-scientific refutation of all skilled achievement beyond his own limited skill. Curious enough—but perhaps not so strange, either—it is this moron of thought who is the gullible, credulous, all-believing, well-wishing chap who hurries to any and all miraculous modes and means of helping the poor and unfortunate sick—providing that mode or means of assistance can be delivered by himself at a sizeable profit. And the more incredulous, ridiculous and impossible the fulfillment of his promises, and the greater the infringement upon the accepted dictum of accredited aid, the louder he shouts. Together with the far-seeing and sometimes not at all too truthful (even though he did know better) commercial salesman, he makes a formidable affront and attack that returns to him a beginning of financial success that elevates him to a position far beyond his mental capabilities and one he knows—deep in his own heart—he is not worthy to fill. But, nevertheless, he goes on shifting his array of attack with the changing straws of the therapeutic wind. And at times, sought by those who may benefit commercially, he even assumes to write, recording phenomena of observation and attempting deduction and explanations of physiological processes that would do credit to trained clinicians and laboratory experts of unlimited facilities and years of practice—if they were only true. Sadly enough, he is read by some who want to believe what he writes and, not having authority wherein his prating can be contradicted, he is accepted as a possibility. Many times his readers attempt to accomplish his claims—even at the risk of purchasing expensive equipment, with which to duplicate the promised results—and perhaps just as often fail. The chagrin and reaction to failure more often than otherwise brings contempt and disgust and serious condemnation. Many means of therapy have known just such a fate, and perhaps rightly, too, but undeniably there are others discarded because of just such an inadequate background. Unfortunately, physiotherapy was handed to the profession and the public in its beginning by many members of this lunatic fringe, and undoubtedly should have gone the way of the charlatan route had not the great war called its activities to the front and had not its merits risen to the demands made, even as exacting as they were—and had not men of scientific attainment seen the possibilities therein and insisted upon the development of this branch of therapy along the tested and tried lines of other scientific procedures. Too much of the untrue, too much of the unproven and problematic has been spread—claiming the unattainable for this field—tending to make ridiculous a therapy that, properly held and propedly used, can stand on its own merits unassisted. Happily, that time has arrived, or is fast arriving when the accumulated experimental data and the proven clinical knowledge of experience will be correlated and its proper place in treatment assigned with the dignity deserved. The four winds are burdened overly heavy scattering this physiotherapy chaff to the discard heap, and now comes the steady grind of the experimental mill, turning slowly, but nevertheless acccurately, and truthfully carrying to us the everlasting facts. A fond "adieu" to

the temporary activity of the lunatic fringe in physiotherapy.—W. Scott Keyting, in *J. Radiol.*, July, 1925.

Dental Progress in Greece: The development of dentistry in Greece began with the establishment of the dental faculty in the University of Athens, which is managed by the professor of anatomical pathology, Dr. Gons Melissinos. In comparison with other colleges in Europe or in America, the faculty lacks a good deal, but it keeps pace with the latest developments. The pioneers of the establishment and organization of the faculty should be proud of it, and they will always hold an honored place in Greek dental history. This college, in spite of its very small accommodations and very poor equipment, has a large number of students, and I think that for this reason it will be compelled to establish another dental faculty in the University of Salonika, which will serve the northern provinces of Greece and also some of the neighboring Balkan States. We are on the eve of another progressive step, great and momentous in character. In a short time the government will pass a bill to organize all the dentists in one society under the name of the "Panhellenic Dental Society." This law purports to define and to protect the rights of the dental profession. All dentists in Greece will have a legal status as state officers and as guardians of the public health in the community. The law stipulates that there shall be a common treasury, insurance and pension, and provides for the better education of the members by means of special lectures and meetings. The dental society will have its own building, with a library, where the different magazines will be received, a hall for meetings, and also amusements, to keep members in touch with each other as in other countries. — S. Papazafiropoulos, in *Oral Topics*, August, 1925.

The Treatment of Thrush with Gentian Violet: In several instances of thrush in which Harold K. Faber and Lloyd B. Dickey (*J.A.M.A.*, Sept. 19, 1925), used mercurochrome-220 soluble (from 1 to 2 per cent aqueous solutions) definite improvement occurred but not with striking rapidity. In a recent epidemic of thrush affecting fifteen infants, they used local applications of 1 per cent aqueous solution of gentian violet, without supplementary washes or other treatment. Smears for the fungus were positive in the twelve cases in which they were made. The gentian violet solution was painted on tongue, gums, hard palate and cheeks, not oftener than once a day, except in one case. Treatments were given half-way between feedings, that is, at intervals of four hours. In four cases, only one application was given; in five cases, two applications; in five cases, three applications, and in one case nine applications. The last case was that of a feeble premature infant with a particularly heavy infection, who received two applications daily. One patient was dismissed before the effects of treatment could be observed. Of the fourteen remaining, seven, or 50 per cent, showed an apparent cure (complete disappearance of visible lesions) in one day or less; five, or 36 per cent, in from two to three days; two, or 14 per cent, in from four to five days. In three instances, the lesions returned after intervals of four, five and nine days, respectively, and in each instance again disappeared after one application of gentian violet. In the last of these cases the patient was treated at irregular intervals in the outpatient clinic, and the lesions again reappeared at later intervals of four and three days, each time disappearing after one treatment. In all instances in which patients were under close daily observation, the lesions after one treatment either disappeared within a day or became very much smaller and less extensive, and progressively diminished until they entirely disappeared. The only untoward effect observed was moderate regurgitation of food noted once in one case following treatment. This may have been a coincidence, since it was not repeated. Toward the end of the ward epidemic, prophylactic treatments were given to nine uninfected infants, none of whom acquired thrush. These were the last to be exposed directly to infected infants, and no further cases of the disease occurred.

Comparative Study of Treatment of Rickets: Reyher and Schmaucks observed thirty-five cases of rickets under different treatment and the same seasonal influences for six months, a year or more. The higher vitamin content of milk, vegetables, etc., during the summer explains the improvement at this season. The sunlight is only a subordinate factor. Pure dietetic treatment by vitamins resulted in good winter recoveries, while florid rachitis sometimes developed in midsummer on a deficient diet. They regard dietetic treatment as the logical treat-

ment of rickets.—*Arch. f. Kinderh.*, abstr. *J.A.M.A.*

Problem of Occlusal Trauma: The notion that man passes through a period of development and then of decline is misleading. The period of rapid decline is youth; the period of slowest decline is old age. When the cell is in the young state, it can grow rapidly; it can multiply freely. When in the older state, it loses those capacities and its growth and multiplication are correspondingly impeded. If organization and specializations are carried far enough the power of growth and multiplication cease altogether.—A. LeRoy Johnson, in *Dent. Cosmos.*

Malnutrition in School Children: MacDougnall has reviewed the histories of 370 patients who attended the nutritional clinic at the Hospital for Sick Children in Toronto. The causes of malnutrition in order of their prevalence, were: mismanagement, physical defects, improper diet and faulty food habits, overfatigue and faulty health habits. Family traits played little or no part. Diseased tonsils and adenoids, and teeth were the main physical defects causing malnutrition. MacDougnall urges that every child applying for entrance to the public school be examined in the presence of his parents and required to be up to normal weight before he is allowed to assume the burden of full school work.—*Pub. Health J.*, abstr. *J.A.M.A.*

Current System of Medical Education: Unless some happy medium is evolved that will place the medical student at least half way between the deficiencies of the old-fashioned apprentice plan and the superfluities of our overtheorizing and ultra-expensive current system of medical didactics, the present top-heavy scheme is doomed to certain demolition. As matters are arranged now, it takes a man so long to get ready to practice medicine that he is worn out both financially and enthusiastically before he ever places his finger independently on his first patient's pulse. There is so much textbook and laboratory knowledge fed to the embryo doctor that he loses sight of the human element. After all it is what a doctor can do for his patient and not what textbooks and research hours can do for the doctor that is the basis of the healing art. What does it avail a man if the knowledge of the Infinite be his, provided he lacks the facilities for passing on this knowledge to the benefit of mankind? A man does not learn people from books. The exception is the proven rule with the human element. A doctor who clings to his books and forgets the citizenry is like the desert rat learning to swim from a chart and in the depths of shifting sand. Pure joy of discovery is a pleasure not to be denied the true student of the human body, its ails and ills and faculties. But the selfishness of personal perfection in a man's chosen line should be made to yield some tithe of its debt to a mortal world, through the pleasure of service to humanity.—*Illinois M. J.*

Cause and Prevention of Disease: The contributing cause of greatest importance in the matter of predisposition to infections and other forms of disease are fatigue, undernourishment and nervous depression (Alfred Stengel, in *Bull. Listening Post*, Pennsylvania Health Dept.). Fatigue predisposes to pneumonia, and all other conditions developing, often, as "colds." The soldier on the forced march is liable to infective conditions. And, more vital, disease develops in those subjected to chronic fatigue, the tired housewife, the overworked young wage earner, the ambitious man, who works by day and studies at night. Undernourishment, particularly in childhood, predisposes to disease, especially tuberculosis. Widespread undernourishment in Europe has led to widespread infections and other diseases. Undernourishment has been found at the root of hospital cases involving nervous and abdominal conditions. In a great variety of diseases, nervous depression is an influence of prime importance. Marked strain or shock may lead to cardiac, renal or gastrointestinal disease or infection, such as tuberculosis. Fatigue and undernourishment must be considered in their possible bearing on nervous depression. The author stresses the importance of considering the environmental and other predisposing causes of disease. He concludes: "Lest I seem to slight the wonderful advances that have been made in the scientific knowledge of disease, its recognition and treatment, let me add and emphasize that my purpose in laying stress upon the environmental and other predisposing causes of disease was to indicate a conviction that, from the standpoint of the public health, more and more attention should be given to the circumstances and conditions under which people live. We may rest assured that no lack of interest will be taken in every new advance in the scientific study of disease.

Antiseptics: Dental surgery must in the main be antiseptic in character, and it is interesting to consider the various branches of dental practice in which they play a part. The treatment of diseases of the gums, the treatment of root canals, mouth washes, dentifrices, filling materials and last, but not least, the care of the dental armamentarium—in all these aspects of dental practice antiseptics play an important part. It is well, however, that we should keep clearly in mind the limitations of antiseptic action, for it is as important to know what antiseptics cannot do, as to know their positive value. When our patients make some remark which indicates a touching faith in antiseptics as such merely because of a generic label attached to a heterogeneous body of chemicals, it may be hard to restrain a smile. Yet we ourselves are not always free from the reproach of regarding antiseptics as though they were a fetish. It may be justly alleged that often we employ antiseptics in an empirical fashion without discriminating between different groups, or without realizing that the terrain in which they may act may impose an insuperable barrier to an action which seems so potent when estimated on bacteria in a test-tube. The use of antiseptics without a knowledge of their chemistry and of bacterial biology may become one of those idols of the market place of which Bacon speaks.—*Brit, Dent. J.*

Dental Diagnosis: An adequate procedure for making a dental diagnosis will involve, as a minimum, the following: A knowledge of the patient's systemic defense and systemic involvements, both present and past. The securing of this will involve: (a) A knowledge of the various systemic disturbances that may be produced or aggravated by the dental infection, with or without the patient's recognition of their existence. A knowledge of the systemic disturbances includes, for differentiating purposes, a knowledge of the etiological pathology of the involved tissues of most of the morbid conditions of the human body, regardless of the type of tissue or the involved nature of the functions. These are based upon a thorough knowledge of the gross and minute anatomy of the various organs and tissues of the body, and the normal functions of those tissues, with special reference to the nervous system.

(b) A roentgenographic study, with a knowledge that is physically impossible for the roentgen-rays to disclose much of the essential information, the roentgenogram being simply a record of relative total densities of the planes involved. (c) A familiarity with the use of the microscope and such laboratory technic as serological study of the fluids of the body, since many of the lesions, being produced or aggravated by dental infections, are in evidence by microscopic and chemical methods long before they appear clinically as symptoms.—George F. Seeman, in *J. Tennessee Dent. Assn.*

Health of Teachers: Although at present there is very little significant material on teachers' health to which one can be referred, more and more we find evidence that active interest in the subject has been aroused. For several years, the board of education, Washington, D. C., has taken an active interest in safeguarding and improving health conditions among its teaching personnel. Under the direction of Dr. Joseph A. Murphy, chief medical and sanitary inspector, the work was inaugurated and enforced until now it may be classed as some of the most progressive in this particular field. All applicants to the normal schools or for teaching positions are given a complete physical examination and the result of such examination is filed with the official report. No applicant may receive a certificate to teach in the schools of this city who does not pass this standard physical examination or if corrective defects are found does not have them corrected within a given time designated by the inspector. Medical inspectors and school nurses are charged with the responsibility of reporting to the chief medical and sanitary inspector for further investigation any insanitary condition they observe in the schools or a teacher in the service whose physical condition appears to be below par. One thousand fifty-five original examinations and 135 reexaminations were made of applicants for teaching positions or applicants for the normal school, Washington, D. C., a total of 1,190 examinations; of these 507 were passed, 617 passed conditionally, sixty-three were rejected temporarily, and three were rejected permanently. In this group of 1,055 prospective teachers there were found 3,657 defects, an average of 3.46 defects per applicant: poor nutrition was found in 17.5 per cent, defective vision, 20.1; defective hearing, 1.3; diseased tonsils, 6.5; defective teeth, 40.1; pulmonary disease, 1.2; cardiac disease, 6.0; orthopedic defects, 2.6; nervous defects, 3.4; not suc-

cessfully vaccinated, 3.2—Ella D. Fleming, in *Nation's Health*, Aug. 15, 1925.

Care of Pregnancy: The presence of foci of infection should be noted and their discovery is as a rule not difficult or time consuming. The teeth, tonsils and sinuses of the skull are the greatest offenders. The woman who harbors infection is more likely to have toxemia, and, I believe, a little more likely to abort by reason of changes in the placenta due to blood borne infection. The relation between foci of infection and abortion has recently been emphasized by Curtis.—W. C. Danforth, in *Boston M. & S. J.*, Aug. 20, 1925.

Roentgen Ray in Incipient Decay: The value of the X-ray in discovering incipient decay, particularly in bicuspids and molars, cannot be overestimated. In our young patients, the early discovery of incipient caries eliminates these "surprise" cavities and enables us to stop the destructive process before the organisms have encroached too closely upon the pulp or invaded too much dentinal tissue. We must remember that the tubules are larger in these young teeth and therefore the carious process is much more rapid. "Surprise" cavities with pulp involvement are an indictment against the dental care we are giving our young patients, and trusting parents have a right to expect something better. I am at the present time taking care of a boy 13 years of age who has twelve proximal cavities in his bicuspids and molars only two of which were discernible by careful digital examination. The X-ray revealed the other ten. Why wait until these ten are large enough to find with an explorer and until the dentin is invaded half way to the pulp or further? This was the boy's first visit to me and he came only for prophylaxis. The question immediately arises how shall we fill such cavities as these for our young patients? Shall we cut the typical cavity with usual extensions and box-like form? I am afraid of the traumatic shock in the operation and the thermal shock afterwards because a metal filling is the only restoration that will preserve the contact and mesio-distal dimensions of the teeth.—J. J. T., in *Michigan State Dent. Soc. Bull.*, August, 1925.

Medicine and Dentistry: The practitioner of odontology is neither more nor less important than the practitioner of medicine; they are two brethren born at different periods, and odontology owes to its elder brother—medicine—some of the knowledge that it has been able in its longer existence to attain. Both have the same philanthropic mission of healing; but they form two distinct organizations, as far as instruction and practice are concerned. Physicians devote themselves to the care of the whole of the system; odontologists to a part only; on the other hand, the former performs his task by assuming the direction and leaving the proper therapeutic agencies to qualified specialists. Odontologists have to devise for themselves and apply all that they may think necessary for effecting their cures. The physician has a superior training, because the years he passed at the university were spent by the dentist in the laboratory and in the hospital in order to obtain the necessary manual dexterity. Medicine enjoys more social prestige than is accorded to odontology, although the origin of the one is as modest as that of the other, but medicine, owing to its long history, is a science that has taken deep root in the public esteem, while odontology, which fifty years ago only began to stammer feebly the mere elements of its science, has now reached a period of true development, and it is impossible to impose any limit to its expansion.—Luis Subirana, in *Oral Topics*, July, 1925.

Congenital Syphilis: Lesions of the teeth appear to be very much misunderstood. In the first dentition, absence of teeth, irregular distribution or very early extensive decay may arouse a strong suspicion. The true Hutchinsonian teeth occur only in the second dentition and their variation from normal is of great magnitude. The slightly notched, the saw-edge, and the teeth with a row of round depressions half way between cutting-edge and gum are due to malnutrition and not to syphilis. Hutchinsonian teeth are definitely pegged or conical, sometimes truncated or with wide, square or crescentic notches, and of the cauliflower type of molar described by Walls.—P. H. Sylvester in *Boston M. & S. J.*, Aug. 27, 1925.

Acetylene, Ethylene, Prophylene: These anesthetics have been given a trial at Guy's Hospital and report of the results is made by Shipway (*Lancet*, May 30, 1925). While a favorable view has been taken of ethylene, acetylene was discarded after a short trial, and prophylene has received as yet insufficient trial to warrant the drawing of definite conclusions. So far, results from its use have been good.—*J.A.M.A.*, July 4, 1925.

Chlorine Treatment of Respiratory Diseases: The chlorine treatment in our hands gives no evidence of even partial sterilization of the mucous membranes of the upper air passages. It does not kill *B. prodigiosus* sprayed on these membranes. We are of the opinion that, in the doses used, the chlorine is neutralized and becomes inert, and that effective doses are too toxic.—Nichols, Simmons and Hitchens (Medical Corps, U. S. Army), in *Am. J. Pub. Health,* August, 1925.

The Structure of the Teeth in Relation to Dental Disease: From a recent investigation of a large number of ground sections of teeth, to all outward appearances of perfect structure there appears to be hardly a tooth of civilized man which does not show some defects of structure, and in the few teeth from neolithic skulls examined defects were of equal extent. A third molar of neolithic age showed more numerous imperfections of structure than any apparently sound modern tooth examined; this tooth, besides other defects, had a deep fissure in the enamel extending in the dentin, although before section the tooth appeared to be of particularly fine quality. Despite the fissure and defects in enamel there was no trace of caries. With regard to the effect of defective structure on the initiation of the carious process, too much attention is perhaps given to the lime salt question, to the partial exclusion of that of the action of the fluids of the mouth or the constituents of the blood plasma. In view of the defective calcification of the enamel of apes, which nevertheless remains immune to caries, defective calcification may probably be a much less important factor in the production of caries than has hitherto been supposed. Black (quoted by Mummery) considered that environment and not tooth structure is the principal predisposing cause of caries, that imperfections, fissures, etc., are causes of caries only in the sense of giving opportunity for the action of the causes that induce it. Defects of structure of the enamel are common in modern teeth; in this respect they compare on the whole unfavorably with those of ancient races and with uncivilized man, but we are still much in the dark with regard to the influence, in themselves, of these defects on caries, and it would appear that such defects influence the occurrence of caries only where associated with retention centers for fermentable foods. There can be little doubt that such defects in the enamel will lead to more rapid destruction when once the process of caries is started and thus act as a contributing cause.—J. Howard Mummery, *Med. Res. Council, Special Report Series* No. 70, 1922; abstr., *Am. J. Pub. Health,* August, 1925.

Dietetics in 1814: Following is an extract from the diary of the great Australian explorer Flinders, on a voyage to Terra Australis in 1814: "At this time we had not a single person on the sick list, both officers and men being fully in as good health as when we sailed from Spithead. I had begun very early to put in execution the beneficial plan first practiced, and made known by the great Captain Cook. It was in the standing orders of the ship that on every fine day the deck below and the cockpits should be cleared, washed, aired with stoves, and sprinkled with vinegar. On wet and dull days they were cleaned and aired without washing. Care was taken to prevent the people from sleeping upon deck, or lying down in their wet clothes; and once in every fortnight or three weeks, as circumstances permitted, their beds, and the contents of their lockers, chests and bags were exposed to the sun and air. On the Thursday and Sunday mornings the ship's company was mustered, and every man appeared clean shaved and dressed; and when the evenings were fine, the drum and fife announced the forecastle to be the scene of dancing; nor did I discourage other playful amusements, which might occasionally be more to the taste of the sailors, and were not unreasonable. Within the tropics, lime juice and sugar were made to suffice as antiscorbutics; on reaching a higher latitude, sauer kraut and vinegar were substituted; the essence of malt was reserved for the passage to New Holland and for future occasions. On consulting with the surgeon, I had thought it expedient to make some slight changes in the issuing of the provisions. Oatmeal was boiled for breakfast four days in the week, instead of three; and when rice was issued after the expenditure of the cheese, it was boiled on the other three days. Pease soup was prepared for dinner four days a week as usual; and at other times two ounces of portable broth in cakes, to each man, with such other additions of onions, pepper, etc., as the different messes possessed, made a comfortable addition to their salt meat. And neither in this passage nor, I may add, in any subsequent part of the voyage, were the

officers or people restricted to any allowance of fresh water. They drank freely at the scuttled cask, and took away, under the inspection of the officer of the watch, all that was requisite for culinary purposes; and very frequently two casks of water in the week were given for washing their clothes. With these regulations, joined to the due enforcement of discipline, I had the satisfaction to see my people orderly and full of zeal for the service in which we were engaged; and in such a state of health that no delay at the Cape was required beyond the necessary refitment of the ship, and I still hoped to save a good part of the summer season upon the south coast of Terra Australis."—"Source Book of Australian History," compiled by Gwendolen H. Swinburne, in *Oral Topics*, July, 1925.

Irradiation of Milk and Healing of Rickets: Three children who were definitely rachitic (confirmed by roentgen ray) were placed on a diet not conducive to healing rickets, and containing only 1 pint of milk (winter milk) which was considered the only source of antirachitic substance. The milk destined for two of the children was exposed to the rays of mercury vapor lamp of the Hanot type before it was given to them, while the third child received untreated milk. The irradiation was carried out twice a day by exposing the milk in a shallow dish at a distance of 3 feet for thirty minutes. At the expiration of one month, the roentgenogram of the wrists of the children along with the control showed a decided increase in calcification in those who were treated with the irradiated milk.—S. J. Cowell, in *Brit. M. J.*, abstr. *Am. J. Dis. Child.*, July, 1925.

Oatmeal and Rickets: Most of our readers will be familiar with the recent work of Professor Mellanby, who showed that the cereals, especially oatmeal contain a "pro-rachitic" substance inimical to calcification. Professor Mellanby also found that the calcification of teeth was also affected unfavorably by the cereals. In a letter which appears in the *Lancet* for July 25, Dr. Tombs suggests as an explanation that the "pro-rachitic" effect of oatmeal may be due to the high percentage of fat which it contains, namely, 5.9 per cent. This fat forms insoluble calcium soaps in the intestines, which are excreted unabsorbed into the feces. The percentage content of fat in the various cereals corresponds very closely with their pro-rachitic action, as tested by Professor Mellanby, who himself suggested that this pro-rachitic action was associated with fatty acids, as he found that a pro-rachitic substance could be obtained by the saponification of oatmeal with soda and the extraction of the mixture with petrol-ether. This explanation suggests a feasible reason for the curious action of oatmeal and other cereals in retarding calcification in spite of their high calcium content.—*Brit. Dent. J.*, Aug. 15, 1925.

Growth of Chinese: Merrins reported teeth to be defective in 35 per cent of his cases. Bolt, among 685 Tsing Hua college students, found only 90 who had poor teeth. He classified the teeth of twenty-nine as excellent and of 508 as good or fair. I reported the presence of dental caries in 272 out of 699 Chinese children in China, and 300 out of 383 Chinese children in Hawaii. In the present series, 66 per cent had good teeth, 17 per cent had one tooth either decayed or already lost, 12 per cent had two teeth lost or decayed, and 5 per cent had three or more teeth decayed or lost. The number of decayed teeth has been taken for the entire number of cases rather than according to age groups, because I found that when 699 Chinese children in China were arranged according to age, 14 per cent of the 3 year old group, 25 per cent of the 4 year old group and 43 per cent of the 5 year old group had decayed teeth, while after 5 years of age, the percentage varied irregularly but never dropped lower than 29 per cent nor went above 54 per cent. Irregular and supernumerary teeth are much more common in Chinese than in European races. Twenty-seven out of 224, that is, 12 per cent, had strikingly irregular teeth. This suggests a physiologic racial difference in development of teeth which is not due to difference in diet.—V. B. Appleton, in *Am. J. Dis. Child.*, July, 1925.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Medical Association, April 19-23, 1926, Dallas, Texas.

Dental Protective Association of the United States, December 21, 1925, Chicago, Illinois.

International Orthodontic Congress, August 16-22, 1926, New York City.

Pacific Coast Dental Conference, June, 1926, Portland, Oregon.

Seventh International Dental Congress, August 23-28, 1926, Philadelphia, Pennsylvania.

STATE SOCIETIES

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

National Capital at Washington, D. C., first Tuesday of every month.

December (1925)

Nevada, at Reno (13).
New York, First District (2-4).
Ohio, at Columbus (1-3).

February (1926)

Minnesota, at St. Paul (10-12).

March (1926)

Louisiana, at New Orleans.

April (1926)

Alabama, at Birmingham (12-14).
Connecticut, at Bridgeport.
Kansas, at Wichita (19-21).
Michigan, at Detroit (12-14).
New Jersey, at Trenton (14-17).
North Carolina, at Richmond, Va. (13-15).
Virginia, at Richmond (13-15).

May (1926)

Illinois, at Springfield (11-13).
Indiana, at Indianapolis (17-20).
Maryland, at Baltimore (3-5).
Massachusetts, at Boston (3-7).
Missouri, at Jefferson City (17-19).
Montana, at Helena (26-28).
Nebraska, at Lincoln (17-20).
New York, at New York City (19-22).
South Carolina, at Columbia.
Tennessee, at Nashville.
West Virginia, at Clarksburg (17-19).

June (1926)

California, at Portland, Oregon.
Colorado, (17-19).
Georgia, at Savannah (9-11).
Maine, at Augusta (last week).
New Mexico, at Santa Fe (20).
Oregon, at Portland.
Washington, at Portland, Ore. (8-13).

July (1926)

Wisconsin, at Madison (14-16).

August (1926)

Pennsylvania, at Philadelphia.

November (1926)

Arizona, at Phoenix.

Chicago Dental Society, at Chicago, January 27-29, 1926.

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

Arizona, at Phoenix, December 7, 1925. Secretary, Eugene McQuire, 104 Physicians Building, Phoenix, Arizona.

California, at San Francisco, December 5, 1925. Secretary, O. E. Jackson, 155 Kentucky Street, Petaluma, California.

Colorado, at Denver, December 1-5, 1925. Secretary, William H. Flint, Littleton, Colorado.

Connecticut, at Hartford, November 17-19, 1925. Recorder, Arthur B. Holmes, 43 Central Avenue, Waterbury, Connecticut.

Indiana, at Indianapolis, November 9, 1925. Secretary, J. M. Hale, Mt. Vernon, Indiana.

Iowa, at Iowa City, December 7-10, 1925.

Kansas, at Wichita, December 7, 1925. Secretary, George E. Burket, Kingman, Kansas.

Michigan, at Ann Arbor, November 16-21, 1925. Secretary, J. W. Lyons, 617-21 Dwight Bldg., Jackson, Michigan.

Nevada, at Reno, December 9, 1925. Secretary, G. H. Marven, P. O. Box 56, Reno, Nevada.

North Carolina, at Raleigh, January 11, 1926. Secretary, F. L. Hunt, Asheville, North Carolina.

North Dakota, at Fargo, January 12, 1926. Secretary, W. E. Hocking, Devils Lake, North Dakota.

Oklahoma, at Oklahoma City, January 11-15, 1926. Secretary, L. M. Doss, 201 American National Bank Building, Oklahoma City, Oklahoma.

Pennsylvania, at Philadelphia and Pittsburgh, December 9-12, 1925. Secretary, Alexander H. Reynolds, 4630 Chester Avenue, Philadelphia, Pennsylvania.

Rhode Island, at Providence, November 17-19, 1925. Secretary, Albert L. Midgley, 315 Butler Exchange Building, Providence, Rhode Island.

Wisconsin, at Milwaukee, December 14-19, 1925. Secretary, S. F. Donovan, Tomah, Wisconsin.

MASSACHUSETTS DENTAL SOCIETY

The sixty-second annual meeting of the Massachusetts Dental Society will be held in Boston, May 3-7, 1926.

HAROLD W. ALDEN, *President*,
160 Main St.,
Northampton, Mass.
WILLIAM H. GILPATRIC,
358 Commonwealth Ave.,
Boston, Mass.

NEVADA STATE DENTAL ASSOCIATION

The annual meeting of the Nevada State Dental Association will be held, Saturday, Dec. 13, 1925, commencing at 9 a. m., at the office of Dr. Thomas H. Suffall, 237 North Virginia Street. The remainder of the session will be held in the assembly hall of the Chamber of Commerce in the Y. M. C. A. Building.

Please notify the secretary as soon as possible as to your attendance in order that we may be the better enabled to make arrangements for the banquet.

PROGRAM

9:00 a. m. Clinic on Oral Surgery,
By Dr. Henry Miller of San Francisco.
In Dr. Suffall's Office.

1:00 p. m. Business Meeting and Election of Officers
At the Y. M. C. A.

2:00 p. m. Dr. Forest Orton of the University of California. Table Clinic on Veneer Crowns. Followed by an Interesting Lecture on the Restoration of Occlusion.

3:30 p. m. Dr. Leland Carter, of the University of California. Interpretation of Roentgen Ray, with lantern slides.

4:30 p. m. Dr. John Henley, of the University of California. Lecture on Operative Dentistry.

6:00 p. m. Banquet.

9:00 p. m. Private Vaudeville.

GEORGE A. CARR, *Secretary*,
216 F. & M. Bank Building,
Reno, Nev.

NEW JERSEY STATE DENTAL SOCIETY

The fifty-sixth annual meeting of the New Jersey State Dental Society will be held at the Stacy-Trent Hotel, Trenton, April 14-17, 1926.

R. S. HOPKINS, *Director of Exhibits*,
913 Broad St., Newark, N. J.
F. K. HEAZELTON, *Secretary*,
223 E. Hanover St., Trenton, N. J.

OHIO STATE DENTAL SOCIETY

The sixtieth annual meeting of the Ohio State Dental Society will be held in Columbus, Dec. 1-3, 1925. An excellent program

has been prepared. Exhibitors are requested to address Dr. W. V. Walton, Jr., 47 Parsons Ave., Columbus.

EDWARD C. MILLS, *Secretary*,
255 E. Broad St., Columbus, Ohio.

MICHIGAN STATE DENTAL SOCIETY

The seventieth annual state meeting of the Michigan State Dental Society will be held in Detroit, April 12-14, 1926.

WILLIAM R. DAVIS, *Secretary*,
1932 Taylor Ave.,
Detroit, Mich.

BOARD OF DENTAL EXAMINERS OF STATE OF ARIZONA

The next meeting of the Arizona Board of Dental Examiners will be held in Phoenix, beginning Dec. 7, 1925. Applications must be in the hands of the Secretary of State at least twenty days before examination.

EUGENE MCQUIRE, *Secretary*,
104 Physicians Building,
Phoenix, Ariz.

BOARD OF DENTAL EXAMINERS OF CALIFORNIA

The next examination given by the Board of Dental Examiners of California will be held in San Francisco, Dec. 5, 1925. All credentials must be in this office by November 10. An examination for dental hygienists will be given also on December 5. These credentials must also be in by November 10. Information can be obtained by addressing

O. E. JACKSON, *Secretary*,
155 Kentucky St.,
Petaluma, Calif.

OKLAHOMA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Oklahoma State Board of Dental Examiners will be held at Oklahoma City, Jan. 11-15, 1926.

L. M. DOSS, *Secretary*,
201 American National Bank Bldg.,
Oklahoma City, Okla.

NORTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

The North Dakota State Board of Dental Examiners will hold its next examination in Fargo, beginning at 9 o'clock, Tuesday morning, Jan. 12, 1926. For further information and application blanks, address

W. E. HOCKING, *Secretary*,
Devils Lake, N. Dak.

PENNSYLVANIA STATE DENTAL COUNCIL AND EXAMINING BOARD

The next examination of the Pennsylvania State Dental Council and Examining Board will be held in Philadelphia and Pittsburgh, Dec. 9-12, 1925. The examination in theory will be held in the civil service rooms at City Hall, Philadelphia, and at the University of Pittsburgh, in Pittsburgh. The examination in practical work will be held at Temple University, Philadelphia, and the University of Pittsburgh, December 12, beginning at 8:30 a. m. An examination for hygienists will be held at the same time and places. Application papers may be secured from the Department of Public Instruction, Harrisburg.

For further information, address

ALEXANDER H. REYNOLDS, *Secretary*,
4630 Chester Ave., Philadelphia, Pa.

CHICAGO DENTAL SOCIETY'S ANNUAL MEETING AND CLINIC

January 27, 28 and 29, 1926
Drake Hotel

The sixty-second annual meeting and clinic of the Chicago Dental Society will be held at the Drake Hotel, Chicago, January 27, 28 and 29, Wednesday, Thursday and Friday. The plans for this meeting have been perfected and contemplate the establishment of a new mark in program building. That the 1926 meeting will excel all previous records of this society is witnessed by the following facts:

1. There will appear on the literary program 256 men to present papers, addresses and discussions in the ten different sections, and at two noon day luncheons and the two big general session meetings.

2. Two and one-half days will be de-

voted to clinics, Thursday afternoon and Friday morning. This clinic program will consist of seven types, as follows:

(a) Progressive clinics
(b) Lecture clinics
(c) Section clinics
(d) Junior clinics
(e) Table and chair clinics
(f) Study club clinics
(g) Senior student clinics

There will be a total of 200 clinics, 100 to be given each half day.

3. The president of the American Dental Association, Dr. Sheppard W. Foster, and Mrs. Foster will be the guests of honor at a banquet, which will be followed by a program of dancing and entertainment.

4. The number of commercial exhibits will excel all previous records; for more space has already been sold (October 10) than for any previous meeting of this society.

Railroad rates have been secured for this annual meeting.

A special invitation is extended to all members of the American Dental Association and to dentists living in foreign countries who are members in good standing in their national societies.

Hotel reservations should be made immediately, direct with the hotels.

We are gratified to announce to the profession that Dr. Otto U. King, General Secretary of the American Dental Association, is Chairman of the Program Committee.

M. M. PRINTZ, *President.*
HUGO G. FISHER, *Secretary.*

DENTAL PROTECTIVE ASSOCIATION

The annual meeting of the Dental Protective Association of the United States will be held at the Palmer House, State and Monroe Streets, Chicago, on the third Monday in December (21) at 4 p. m. The report of the officers will be given; a board of directors will be elected and such other business as should come before the association transacted.

All members are urgently requested to be present.

By order of Board of Directors,
J. G. REID, *President,*
D. M. GALLIE,
Vice President and Treasurer,
E. W. ELLIOT, *Secretary,*
39 S. State St., Chicago, Ill.

THE BETTER DENTISTRY MEETING

First District Dental Society, New York

Open to all members of the American Dental Association, Dec. 2, 1925, (2 p. m.), through Dec. 3 and 4, 1925.

This is preeminently a clinic meeting to offer practical instruction in up-to-date technic. Group and individual clinics begin when the meeting opens.

Addresses and clinics by authorities on subjects of practical importance to every dentist will be interspersed, as follows:

Organized Medicine .....
Wendell C. Phillips, M.D., New York
President of the American Medical Association.
Some facts regarding the organization of the medical profession which are probably not generally known.

Gold Foil.....James Mark Prime, Omaha, Nebr.
An effort to bring gold foil back to its rightful place in dental work. Dr. Prime will also present a clinic.

Nature's Plan in Anatomic Tooth Form .....
James Mark Prime, Omaha, Nebr.
A study of tooth form in relation to function.

Amalgam Technic .....
William E. Harper, Chicago, Ill.
New factors that will be considered to perfect amalgam work. Dr. Harper will also present a clinic.

Dental Amalgams .....
Wilmer Souder, Bureau of Standards, Washington, D. C.
An examination of various alloys by exact measurements. Factors which induce variations in the finished product.

Some Phases of Dentistry .....
S. W. Foster, Atlanta, Ga.
This address will deal with some of the relations of constituent societies to the American Dental Association and is of interest to every society member.

Prosthetic Dentistry .....
Dayton D. Campbell, Kansas City, Mo.
A review of recent researches in the field of full denture prosthesis. Dr. Campbell will also present a clinic.

This meeting is conducted by the Society without selling exhibit space to manufacturers. The lack of revenue from that

source necessitates a charge for admission to the clinics.

A banquet will be held on Thursday evening, to be followed by dancing.

TOPIC QUESTIONS AND DISCUSSION

There is to be a session devoted to topic discussion at which a leader will be assigned to each topic. The leaders will be men who are recognized as authorities in their particular fields. The session will be like a clinic session, each in a group with chairs and a leader, and the leader will simply answer questions.

Sessions and clinics at Hotel Pennsylvania, New York City.

For further information, address

E. M. DAVIES, *General Secretary*,
250 West 57th Street, New York City.

A THREE DAY POSTGRADUATE SCHOOL

To Be Conducted by the Dental Society of the State of New York

The fifty-eighth annual meeting of the Dental Society of the State of New York will be held at the Hotel Astor, in the City of New York, May 19, 20, 21 and 22. Important papers will be presented, together with a specially prepared program of clinics, selected because of their educational value, and in order that the subjects taught in the educational courses may be further elucidated by demonstrations from different men.

EDUCATIONAL COURSES

Prior to the regular meeting, an intensive three-day postgraduate school will be conducted under the title "Educational Courses," Monday, Tuesday and Wednesday, May 17, 18 and 19, 1926, day and night sessions. These courses have been selected to meet a demand indicated by a ballot among more than 3,000 members of the Society. The following courses have been projected: 1. Full Denture Technic. 2. Partial Denture Technic. 3. Root Canal Technic, including Radiography. 4. Extraction, with Special Reference to Difficult Cases, Imbedded Roots, Etc. 5. Anesthesia, Local and by Inhalation. 6. Removable Bridgework, various types. 7. Bridgework, Fixed and Partially Fixed. 8. Cast Gold Inlays, Direct and Indirect Technic. 9. Orthodontia for the General Practitioner. 10. Periodontia for the General Practitioner. 11. Porcelain Jack Crown Construction. 12. Physical Diagnosis. 13. Office Management.

Each course will have at least three teachers, and candidates may enroll for courses under one or under all three teachers, thus rendering it possible for those attending to make their studies purely elective.

All members of the American Dental Association will be eligible to take these educational courses. A booklet, fully outlining the details of the various courses of study, with the names of the teachers and the special parts of the subjects that each will teach, will be ready for distribution early in January. All who are interested, and who wish to receive this booklet will please send their names and addresses to

EDWARD KENNEDY, *Chairman*,
Committee on Educational Courses,
347 Fifth Avenue, New York City.

RESOLUTIONS ON THE DEATH OF DR. WALKER

The passing of Dr. William Wallace Walker removes another of the commanding figures from that rapidly diminishing group of men who are fairly entitled to be designated as the pioneers of organized professional dentistry.

Graduating from the high school of Rochester, New York, about a half century ago, he began the study of dentistry in the office of Ansel A. Morgan. Two years later, he removed to New York City, associating himself with Dr. Cyrus A. Alden.

Soon after his removal here, he interested himself in various dental activities, especially in coordinating the profession and in strengthening the local societies. His deep interest in the First District Dental Society resulted in the formation of the various "classes," now called "sections." He endeavored, by promoting postgraduate teaching, to improve the standard of the profession, and the success of these sections is due to his untiring devotion and long supervision.

He not only served three times as president of this Society, but likewise held the same high office for the same number of years in the New York State Dental Society. He was also president of the National Dental Association (1891-1892) and the New York Odontological Society.

In the death of Dr. Walker, the dental profession of this city has lost one of its

most useful members and organizers, active until the day of his death. To him is due chiefly the credit of combining the various dental activities in the strong organization of the First District Dental Society. In recognition of this valuable service, in 1912, a testimonial dinner was tendered him by this society.

"He is gone, but his memory liveth;
He is dead, his example is here;
The sweetness and fragrance it giveth
Will linger for many a year."

The following resolutions were adopted by the First District Dental Society of the State of New York on the death of Dr. Walker.

WHEREAS, in the Providence of an all-wise Creator, our fellow-member, associate and past president, Dr. William Wallace Walker, died June 14, 1925.

WHEREAS, after a long and useful career of seventy years, as practitioner, journalist, teacher and leader, death has ended the life work of our fellow-member and thrice president, William Wallace Walker, who was universally loved and respected by the dental profession for his wisdom, attainments and high standing, and

WHEREAS, in the death of Dr. Walker, the profession in this city, as well as state and nation, has lost an advanced thinker and an able and enthusiastic exponent of society activities and organization, be it

Resolved, that the First District Dental Society of the State of New York extend their sincere sympathy to Mrs. Walker in her bereavement, which is the bereavement of the whole profession, and express our high regard for the worth and character of this pioneer, who so ably exemplified the highest ideals of American Dentistry; and be it further

Resolved that a copy of these resolutions be spread upon the minutes, inserted in the *Bulletin* and sent to the members of his family and to the dental Journals for publication.

B. W. WEINBERGER,
Chairman, Necrology Committee.

PATENTS RELATING TO DENTISTRY

62889. Des., Dropper bottle, Thomas A. De Vilbiss, Toledo, Ohio.

1465627. Toothbrush holder, F. W. Fisher and H. Johnson, Detroit, Michigan.

1465259. Dental apparatus, Henry Friedman, Chicago, Ill.

1465516. X-Ray film holder, Albert Hallenberg, Fargo, N. Dak.

1465472. Making crowns and forms therefor, Thomas C. Hansen, Caney, Kan.

1465473. Means for molding backings for artificial teeth, Thomas C. Hansen, Caney, Kan.

1465851. Hypodermic needle, Oscar W. Kress, Waterloo, Iowa.

1465522, Toothpick, Russell E. Lunday, Vallejo, Calif.

15681. Reissue, Dental engine handpiece, Will R. Porter, Elmhurst, N. Y.

1465316. Combination inhaler, Ray A. Rice, Columbus, Ohio.

62921. Des., Mallett, William Rosser, Cleveland, Ohio.

1465690. Dental instrument, Edward E. Smith, Philadelphia, Pa.

1465877. Adjustable headrest, George W. Spahr, Mechanicsburg, Pa.

1465379. Denture attaching device, Samuel G. Supplee, East Orange, N. J.

1466578. Pyorrhea remedy, Isabel Clifton, Barberville, Fla.

1466041. Toothbrush holder, John A. Duggan, Detroit, Michigan.

1466474. Mouth-cleansing apparatus, Robert L. Hatcher and H. A. Parr, Detroit, Michigan.

1466299. Device for dental use, Frederic J. Holschneider, Rochester, N. Y.

1466543. Denture, Ira G. Nichols, Mandan, N. Dak.

1465954. Producing carbon dioxide, H. E. Sturcke, Brooklyn, N. Y.

1466982. Dentifrice and floss container, Theodore A. Bailey, Orlando, Fla.

1467024. Tooth paste, Einar Bergve, Christiana, Norway.

1467242. Syringe, M. A. Eistein, Kansas City, Mo.

1467108. Dental film mount, Millard B. Hodgson, Rochester, N. Y.

1466723. Toothbrush, Riichiro Izawa, Shimogyo-ku, Japan.

1466910. Dental measurement wire container, Dwight Lenzi and G. O. Deschamps, Idaho Falls, Idaho.

1466967. Guard for toothbrushes, Frank Shuman, Long Beach, Calif.

Copies of above patents may be obtained for twenty-five cents each, by addressing John A. Saul, Solicitor of Patents, 509 Seventh St., N.W., Washington, D. C.

HE WROTE AS HE READ---
SO HE WOULD NOT FORGET

By Ernest V. Madison

ONE of the most progressive business men the writer ever knew made it a practice to look through his trade papers "from cover to cover."

Before him, on his desk, lay a tab of note paper, and as he read he would jot down memoranda of ideas adaptable to his business.

Quite often, when reading an advertisement, he wrote down the name and address of the advertiser followed by "Get Catalog D" or "Send Bulletin 12." From these slips he dictated requests to the advertisers for their literature. In this way, he followed up every lead that might mean an improvement in his business facilities.

The note pad was his incentive to action at the time he was reading, his insurance against forgetting to write.

There is a tip here for all of us: It is well to utilize the ideas of others; to recognize that ideas come from all points of the compass; and it pays to follow through every lead that seems to offer benefit to ourselves or our business.

It may be possible to attain the top unaided, but, as in mountain climbing, progress will be made more rapidly and safely, if we accept the suggestion and assistance of other travelers.

The advertising pages of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION are filled with ideas and information directed toward your business—and calling for only the mere reading.